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JAMES SYME, F.R.S.E.,

PROFESSOR OF CLINICAL SURGERY IN THE UNIVERSITY OF EDINBURGH,
ETC. ETC.

MY DEAR MR. SYME,

Not the least among the many sources of pleasure which writing this book has afforded me, is the opportunity of inscribing your name on its first page, in token of my gratitude to you for innumerable acts of personal kindness, no less than of my admiration of that skill and judgment, as a surgeon and as a clinical teacher, which have rendered your name illustrious.

Assuring you that I feel your acceptance of this trifling acknowledgment to be another addition to the many obligations you have conferred on me,

I beg to remain,
My dear Mr. Syme,
Your sincere and grateful friend,
HENRY THOMPSON.

PREFACE.

Having during the last few years enjoyed considerable opportunities for the study of Prostatic disease, I have aimed at embodying in the following pages, the observations which a careful and laborious prosecution of it has led me to make. I should not have ventured to do so, had the results altogether coincided with those obtained by previous inquirers. The views here maintained of the Anatomy of the healthy Prostate, but particularly of the organ in its most common deviation from the normal state, viz. when the subject of senile enlargement, differ materially from those which have been commonly held. The conclusions I have arrived at are based on extended anatomical researches, embracing an examination of not less than seventy original dissections, forming preparations now in my own possession, in addition to such observation of the contents of our metropolitan museums as I have been able to make. The data from which such conclusions were drawn have been appended, so far as it was possible to do so, that the scientific enquirer may form his own opinions respecting them. The points to which I desire especially to request his attention may be briefly stated as follows:—

The assignment of the "third" or "middle lobe," as a separate anatomical portion of the Prostate, to the abnormal history of the organ;—discussed in the first chapter.

The analogy between the enlargements and tumors of the Prostate and those of the Uterus;—discussed in the second chapter.

An examination of the alleged causes of enlargement of the Prostate, resulting in new views of this subject;—in the third chapter.

The effects of enlarged Prostate in relation to the function of micturition;—considered in the fifth chapter.

The researches in relation to Malignant and Tubercular disease of the Prostate;—in the ninth and tenth chapters.

The consideration of "the bar at the neck of the bladder;"—in chapter the twelfth.

Besides these, I have treated at length the subject of Diagnosis and Treatment of enlargement, and of the various complications which arise in connection with it, perhaps, I may venture to say, more fully than any preceding author.

And, lastly; I have devoted a long chapter to a consideration of that important, but not uncommon complication of enlarged prostate, stone in the bladder; and especially of the best modes of successfully applying Lithotrity as a means for its removal. I venture to hope that in discussing thus fully the question of Treatment, whether in relation o the simple or the complicated forms of this common mplaint, some hints will be found which may prove useful the varied emergencies of practice. I shall feel abundtly rewarded should some of my professional brethren disver any such fruit as the result of my labours.

16, Wimpole Street, Cavendish Square,
London, Nov. 1857.

CONTENTS.

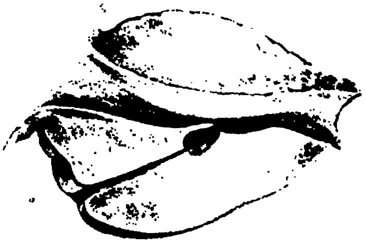
CHAP.		PAGE
I.	The Anatomy of the Prostate	1
II.	The Anatomical characters of the Enlarged Prostate of age	19
III.	The Causes of Senile Enlargement of the Prostate	51
IV.	The Symptoms of Enlarged Prostate	69
V.	The effects of Enlarged Prostate in relation to the function of Micturition. Retention—Incontinence—Engorgement—and Overflow	82
VI.	The Diagnosis of Prostatic and other obstructions at the Neck of the Bladder	92
VII.	The Treatment of Senile Enlargement of the Prostate	106
VIII.	The Treatment of Retention of Urine from Enlarged Prostate	166
IX.	Enlargement of the Prostate from Inflammation	193
X.	Malignant disease of the Prostate	212
XI.	Tubercular disease and Cysts of the Prostate	231
XII.	The Bar at the Neck of the Bladder	239
XIII.	Prostatic Concretions and Calculi	259
XIV.	On the relation between Enlarged Prostate and Stone in the Bladder	277

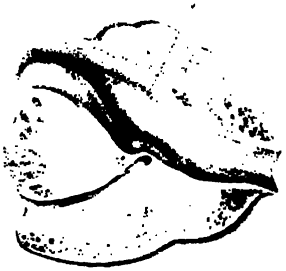
EXPLANATION OF PLATE I.

The upper figure represents a section in the median line of a healthy prostate, of its natural size, accurately drawn from a fresh average specimen, taken from a subject aged fifty-four years: weight of prostate, 4 drachms 48 grains. The utricle is laid open, as well as the ejaculatory duct of the left side marked *a*. This is seen to traverse the wall of the utricle, being slit up to show its situation there (p. 15). The right duct, previously in contact, is removed with the right half of the organ. Both ducts lie closely together in the centre of the posterior median portion of the organ, and there is no sign of the existence of any natural separation of a part of it in this place, to indicate a "third" or "middle lobe" as a distinct formation (see page 4).

The lower figure is drawn from a specimen exhibiting enlargement in a very early stage. It was taken from a subject aged sixty-two years: weight of prostate, 6 drachms 5 grains. The portion lying above the duct is protruding upwards. A small fibrous tumor was found in each lateral lobe, and one of them may be seen projecting a little into the urethra, and rendering the mucous membrane slightly prominent (indicated in the figure by an asterisk). A few concretions are seen in the mouths of ducts around the veru-montanum. In this case the *right* ejaculatory duct was opened; the left, therefore, lies beyond it, and the utricle is not exposed as in the preceding case.

Pl III





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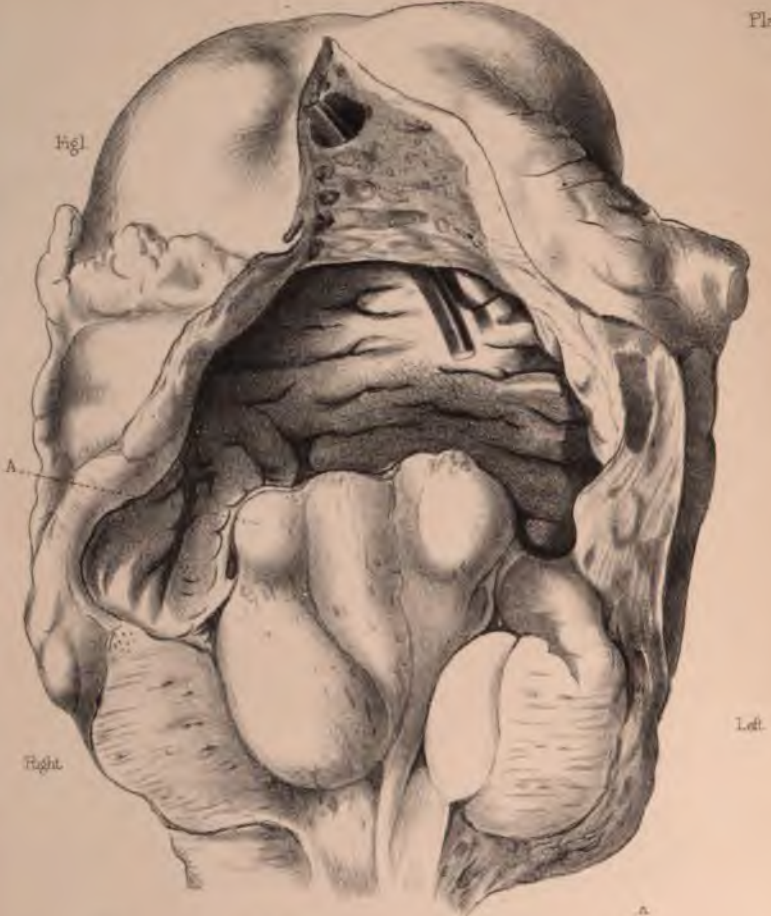
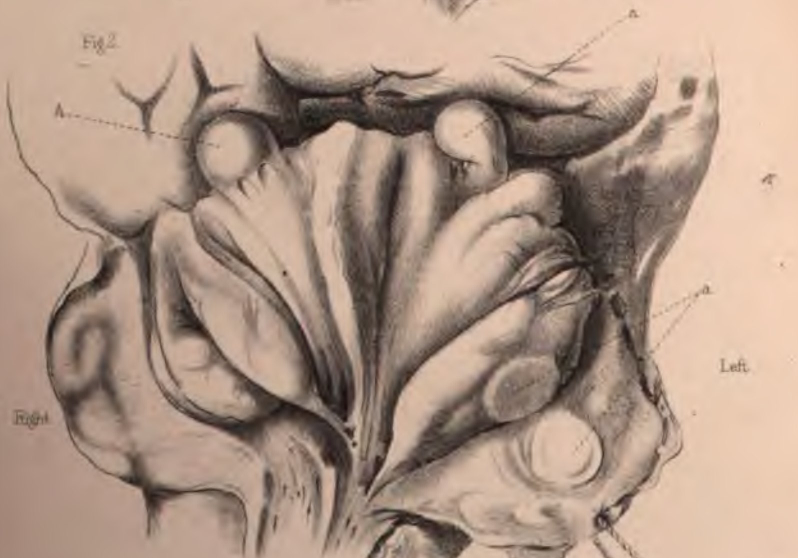


Fig.2.



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EXPLANATION OF PLATE II.

Enlargement of prostate from fibrous tumors; bladder diseased and sacculated. (From Case 1, p. 46.)

Fig. 1 represents a section through anterior part of bladder and prostate. The enlargement of the prostate is seen obstructing the vesical neck and projecting into the cavity of the bladder. A indicates a rounded eminence occupied by one of the tumors, which is dissected out in fig. 2, and denoted there by the same letter.

Fig. 2. Some of the prostatic tumors are dissected out (A and *a*). Others are divided by transverse section; one is well seen, marked *a* at the lower corner of the figure, near to the word "left."

EXPLANATION OF PLATE III.

The bladder, prostate, and a part of the urethra drawn while fresh from a subject who died with abscess of the prostate. The case is reported at full length, p. 208.

The sac formed a cavity capable of containing ten or twelve drachms of fluid. It undermined the mucous membrane of the urethra, opening into the canal by an aperture the size of a florin, situated in the upper part; thus the floor of the urethra alone remained, forming a kind of bridge through the cavity, which extended below, above, and on either side of it. This cavity is bounded by the capsule of the prostate, nearly all the substance of the organ having disappeared. Passing through the cavity is the right ejaculatory duct, found to be dissected out entire.

Pl. 1

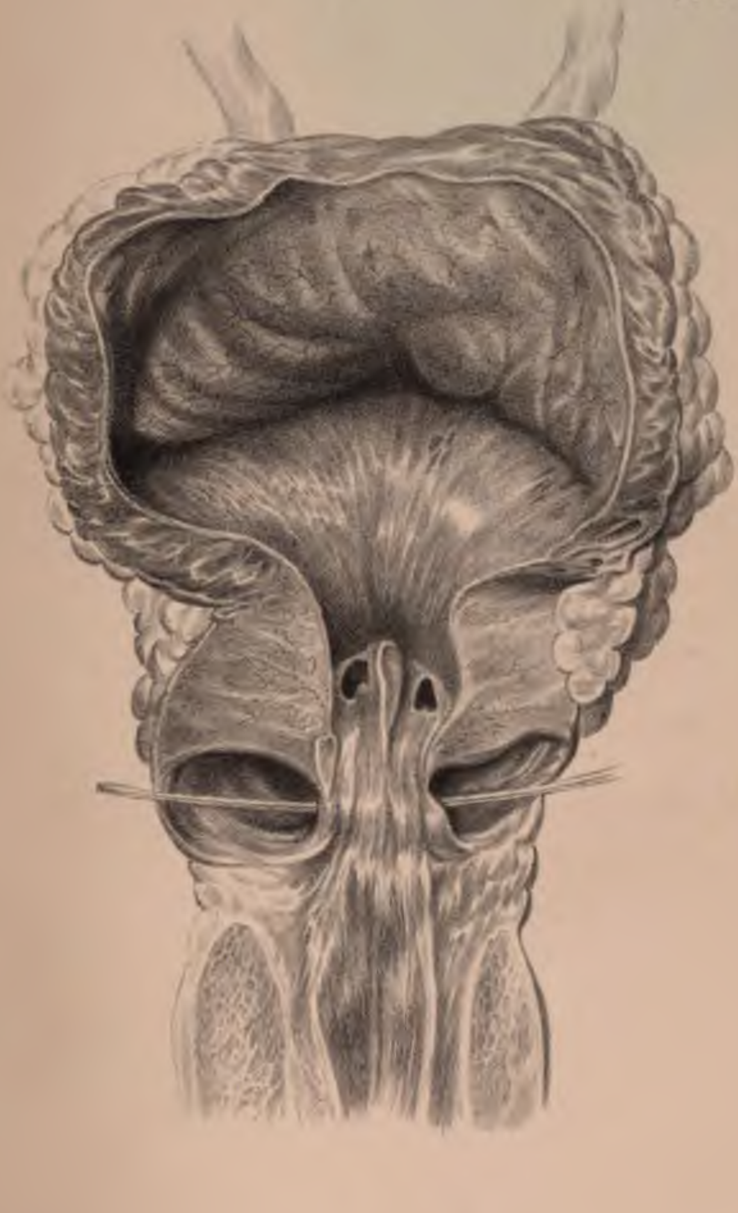

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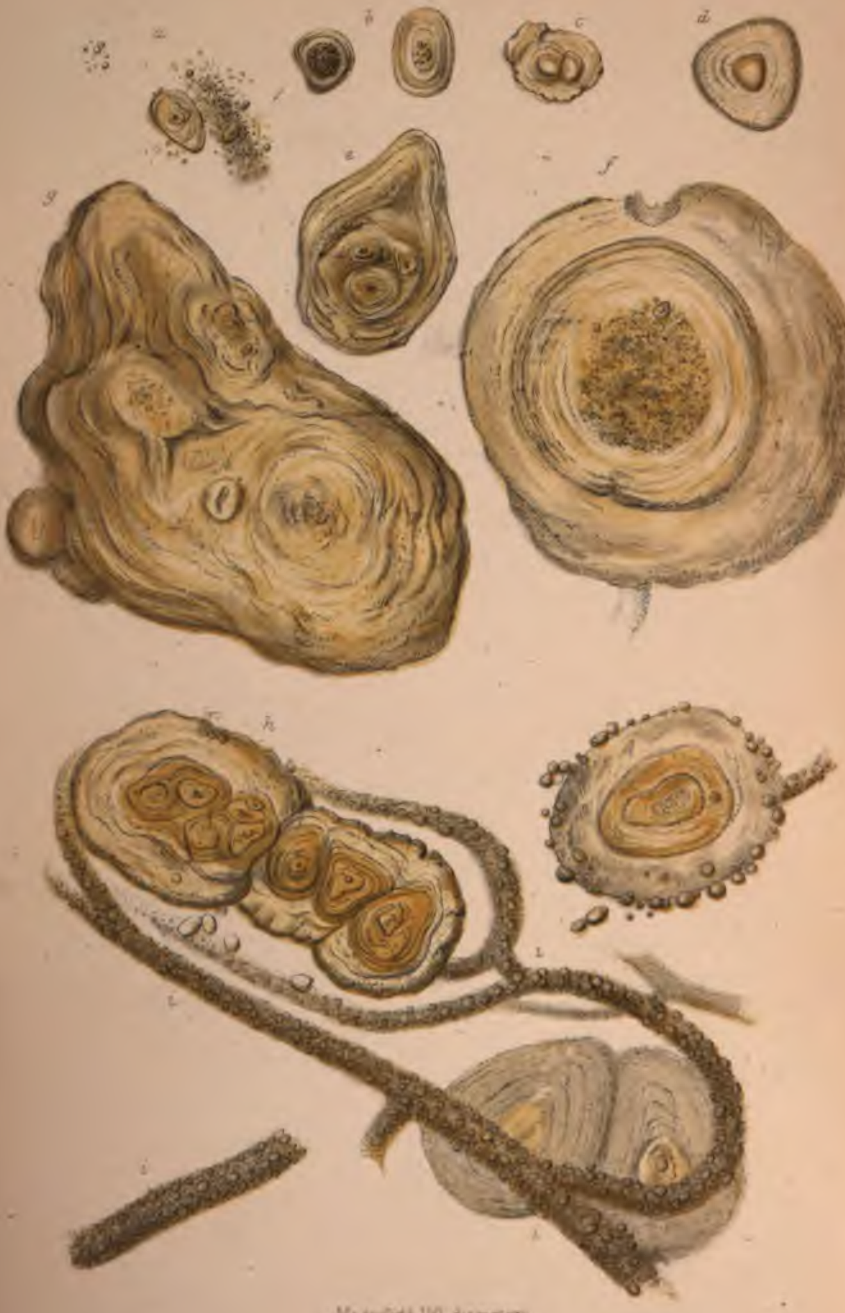
Plate IV



Magnified 150 diameters

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EXPLANATION OF PLATE IV.

Concretions of various sizes, ducts loaded with "yellow bodies," &c.; all drawn under a power of 150 diameters. (See page 260, *et seq.*)

a, b, c, and *d* represent small concretions, apparently in an early stage of formation.

e, f, g, and *h* are larger; most of them appear to be made up of smaller concretions adhering together.

i, i, i, represent ducts loaded with yellow granules of various sizes, "yellow bodies;" this appearance is very frequently observed in the neighbourhood of concretions in an advanced stage of formation, p. 264.

EXPLANATION OF PLATE V.

All magnified to 150 diameters.

Fig. 1. A concretion imbedded in prostatic tissue. It is surrounded by yellow granules; and a vessel stuffed with the same matter is seen.

Fig. 2. Small vessels stuffed with yellow granules, and larger bodies among them. Many of the latter lie free on the section, p. 264.

Fig. 3. An aggregation of numerous small concretions forming one large one. Prostatic epithelium seen free in the field; some appears to contain granules of a yellow colour.

Fig. 4. A large duct cut transversely. Many of these ducts are lined with epithelium containing yellow granules. A concretion lying in the duct. A circular arrangement of fibres seen around the opening, p. 265.

Fig. 5. Fluid expressed from the prostate; it contains similar epithelium, free yellow granules and concretions, p. 264.

Fig. 6. Fluid from vesiculæ seminales, containing numerous yellow granules, p. 269.

Plate V

Fig 1

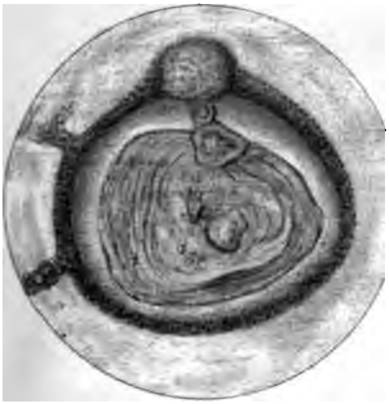


Fig 2

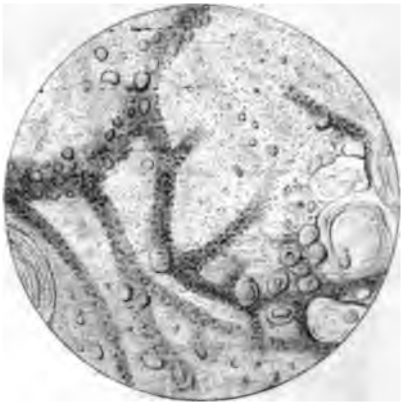


Fig 3

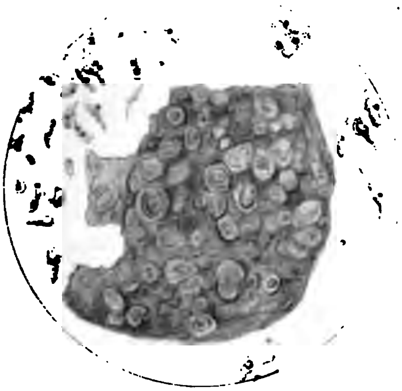


Fig 4

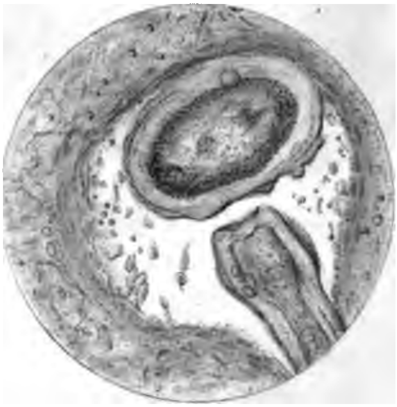


Fig 5

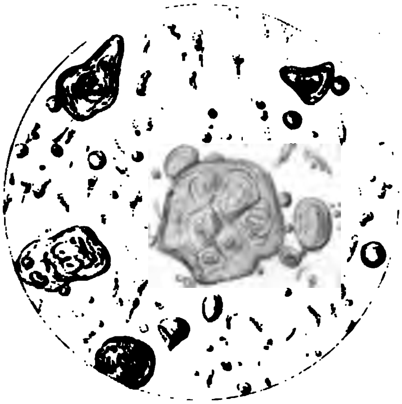
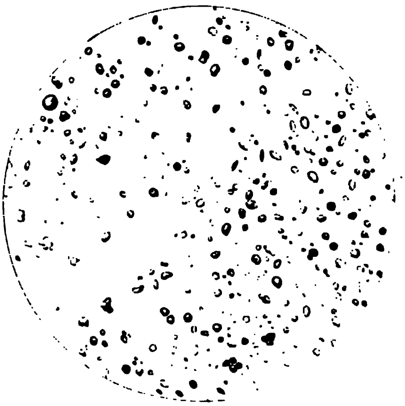


Fig 6



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CHAPTER I.

THE ANATOMY OF THE PROSTATE.

Pathology of the PROSTATE unintelligible without a Knowledge of its ANATOMY.—Form.—Relations.—Position.—Vesiculæ Seminales and Vasa Deferentia.—Prostatic Ligaments, &c.—Conformation of Prostate.—The so-called "Third Lobe."—Origin of the Term.—Home's Researches.—Examination of his Five Cases.—The "Third Lobe" belongs to Morbid, not to Normal, Anatomy.—So regarded by Morgagni, after repeated Examinations; by Santorini and others.—Subsequently by Hunter, Cruvelhier, and others. WEIGHT and SIZE.—Measurements—In Relation to Lithotomy. INTIMATE STRUCTURE.—Views of Ellis, Kölliker, and others.—Glandular Elements. —The Utricle.—Tabular View of Sizes and Weights of Fifty Examples of the Adult Prostate.

IN entering upon a study of the Pathology of the Prostate, there appears to exist a peculiar necessity for observing accurately its normal structure, conformation, and anatomical relations. The most common, as well as important, morbid states to which this organ is subject, either consist in, or are associated with, deviations from the natural size and form, as well as from the natural disposition of the structures entering into its composition. It is apparent that its anatomical relations also must, of necessity, be deranged, when the deviation from size in the direction of enlargement becomes considerable, as it not unfrequently does. Further, while the normal dimensions of the organ have been approximatively determined, it is certain that hitherto the results which have been obtained are not based upon observations sufficiently numerous and extended, definitively to settle the question, inasmuch as very different weights and measurements are named in describing it by various authors.

18

And lastly, our knowledge of its structure, to say nothing of its physiological uses, is, perhaps, less exact and defined, or, at all events, has been so until late years, than other topics in its history which are even less important to the student of disease.

I propose, therefore, first to mention very briefly the topographical relations of the organ, and then to enter somewhat more fully upon an examination of the various physical characters which it presents in the healthy subject.

The adult prostate is generally, and pretty truthfully, described as having the form and size of a large horse-chestnut. It is constituted chiefly by two lateral portions called lobes, approximating at their apices, and increasing in size towards their bases, where they appear to diverge a little; a faint indication of a notch or cleft intervening between them there, and marking the situation of a passage for the urethra, which exists a little above the central axis of the organ.

The prostate lies in intimate connection with the neck of the bladder, and surrounds that part of the urethra which, commencing at the last-named spot, passes from it to the layer of pelvic fascia (known also as " the posterior layer of the deep perineal fascia "), intervening between the rami of the pubic bones at their posterior aspect. The apex of the prostate exists, therefore, where the membranous portion of the urethra begins, and lies immediately behind the fascia alluded to, which structure is continuous also with the enveloping layer, or capsule, of the organ itself. Consequently, it occupies a position situated below and behind the summit of the pubic arch, from which its upper surface is distant about one-half or three-fourths of an inch, and its axis, in the erect position of the body, is directed obliquely downwards and forwards, but inclining nearly to the vertical line. Behind, it lies in contact with the anterior wall of the rectum, its apex being about 1½ inch distant from the anal extremity, and it is rather closely united to the bowel by a delicate cellular tissue. Its base is in contact with the vesiculæ seminales and vasa deferentia, the latter entering it here side by side in the central longitudinal axis. Lying close to the outer side of each of these is a vesicula seminalis, the convolutions of which, instead of converging nearly to a point, as usually described, are very intimately adherent often to the whole base of the lateral lobe adjacent, so much so as to require some care and pains for their removal.

The prostate is held in position, and attached to the pubic symphysis by a portion of the pelvic fascia, forming two folds from the posterior surface of the pubis, constituting "the anterior true ligaments of the bladder," sometimes called also "the pubo-prostatic ligaments." Immediately beneath these it is supported by the levatores prostatæ muscles (by some regarded as anterior portions of the levatores ani), which, arising from the pubic bones close to the symphysis, and from the surface of the fascia, before named, are directed downwards, to be attached to the sides of the prostate, and connected there with its proper envelope.

The conformation of the organ, already indicated, appears to be as follows:—Two lateral divisions or lobes make up the greater portion of the mass or body. Each may be supposed to resemble in form a truncated cone with a convex base. These being placed side by side, with a small interval between them for the urethra, the outline of the body is indicated, and may be tolerably well represented by the conventional form of heart which is seen on playing-cards, excepting that the width requires to be increased relatively to the length. Between these two lateral parts the prostatic substance is continuous above and below the canal; in the first-named situation forming a stratum which extends forwards to the apex, but not quite to the base of the organ.

Below the urethra, another stratum extends throughout the whole length of the lateral lobes, and is thus about one-fourth longer than the upper stratum. It is, as a rule, thicker also, and much more so behind than before. In the centre of its base the two ejaculatory ducts, closely applied to each other side by side, enter a funnel-shaped cavity in its substance, situated usually about three or four lines beneath the posterior urethral orifice. These are directed forwards and a little upwards (in the erect position of the body) from the base to about the centre of the organ at the verumontanum. That portion of the posterior uniting stratum which lies above these ducts is that to which the name of "third" or "middle lobe" has been given, and this part it is which often appears to increase most rapidly when disposition to enlarge is present. It then becomes more or less lobular, being spheroidal or pyriform in shape, by development upwards towards the cavity of the bladder, but in a condition of health does not appear to be so, a fact which I have verified by numerous dissections. It might be named "the median portion," or, better still, "the posterior median portion," as more correctly indicating the part referred to; at all events, as not involving assent to the disputable theory which assigns to it an independent anatomical character.

The relative proportions of these different parts, as they exist in most healthy bodies, will be better understood by examining the upper figure in Plate I. at the end of the work, which accurately represents a longitudinal section of the prostate through the urethra, in a fresh subject, drawn of the natural size from a carefully-selected typical specimen possessing normal characters.

I am aware that by most authorities in this country the existence of "the third lobe" is regarded as a fact in normal anatomy. A very extended investigation which I have prosecuted, with a view to the determination of this and other doubtful points in the anatomy of this organ, has convinced me that there is no part of the healthy prostate entitled to enjoy this distinctive appellation.* In the discussion of this subject it may be desirable to revert briefly to its origin, already mentioned. Sir Everard Home accorded to the part in question the title of "third" or "middle lobe," after five examinations of the organ by dissection, performed by Sir Benjamin—then Mr.—Brodie, and he announced the result as the discovery of "a middle lobe," to the Royal Society, Feb. 20, 1806; the inquiry having been first instituted, to use the words of his paper, only two months before. "Previous to this investigation," says Sir E. Home, "it was not known to me that any distinct portion of the prostate gland was situated between the vasa deferentia and the bladder. These ducts were considered to pass in the sulcus between the two posterior portions, in close contact with the body of the gland."* Notwithstanding this remark, the vasa deferentia had been described as perforating the posterior portion of the prostate, by several of the anatomical authorities of the time, as Sir E. Home afterwards learned, a fact admitted in his first volume on "Diseases of the Prostate," published five years subsequently, viz. in 1811. Respecting the five dissections spoken of, the author says, "the appearance was not exactly the same in any two of them." The first preparation appears to have been from the person of an elderly patient, "who had died in consequence of this part *being diseased:* the nipple-like process was very prominent." In the next, "there was *no apparent glandular substance*" at all in the spot indicated. All that is said of the third is, that "there was a lobe blended laterally with the sides of the prostate gland;" but that there was really no distinct portion marked off as a lobe is clear, from the importance attached to such a formation being detected in the two subsequent cases. The most distinct appearance was found in two subjects of twenty-four and twenty-five years of age respectively; and upon the condition of the organs in these (and not in five) his account seems to have been based, and from these two cases the existence of a law was thus hastily deduced. Whatever may have been their condition (and it must be admitted that, at all events, no change similar to that of senile enlargement was likely to have been present in either), the existence of a distinctly-marked portion of a spheroidal form, situate between the ejaculatory ducts and the veru-montanum, at the inner meatus of the urethra, is so rare an occurrence, as to mark an unusual state, whether congenital or acquired. Had the researches extended to a large number of bodies, it is certain that these cases must have appeared to be exceptional, as my own inquiries have proved such to be. Any appearance of a lobe in this situation must be regarded as belonging not to normal, but to morbid anatomy, a slight development of it being usually attended with some signs of obstruction to the function of micturition. And so far from being overlooked, it is in this manner that it has been regarded, after very careful examination, by the earliest labourers in pathological anatomy who have left to us the records of their observations. Thus Morgagni, in that vast collection of cases which forms his work, "De Sedibus et Causis Morborum," refers to it in several places as to a morbid growth, causing retention of urine; in one of which he describes it, from his own dissection, in the following remarkably precise terms: "A roundish protuberance, of the bigness of a small grape, covered over with the internal coat of the bladder. What this protuberance was I readily supposed; and by forcing the knife into it, I cut through this and the contiguous prostate gland at the same time, lengthways, and showed that it was of the same nature with the gland; that it was very evidently continuous from it, and that there was no doubt but, if it had grown out to a greater degree, it must have been a very considerable impediment to the discharge of urine."* In another case he describes the same appearance, pronouncing it "beyond a doubt an excrescence of the prostate gland."† He quotes several similar cases from Valsalva, Thomas Bartholin of Padua, and Valisneri, who, indeed, speaks of an enlargement, "as it were, a kind of lobe, from the glandular substance" (of the prostate), "which rose up within the bladder, of the shape and size of a walnut, and not on the anterior part, but on that which lies adjacent to the intestinum rectum." He enumerates others, mostly from the "Sepulchretum" of Bonetus,* besides alluding prospectively to another case which subsequently appeared in the succeeding letter of his own work;† and then makes the following generalizations from the whole.

---

* In relation to the nature and extent of this investigation, and the method in which it was pursued, it may be as well to explain, for the purpose of saving further allusion to the subject, that the various statements made in this chapter, and many of those in the succeeding one, are founded upon a dissection of upwards of sixty specimens of the prostate, removed by myself from the dead body, of which fifty, preserved in spirit, were exhibited at the Medical and Chirurgical Society, Feb. 10, 1857, in illustration of a paper entitled "Some Observations on the Anatomy and Pathology of the Adult Prostate, founded upon fifty preparations of the organ, dissected by the author, and accompanying the paper." This paper is published in the fortieth volume of the Society's Transactions, being that for the present year. The method of examination in each case was as follows:—The organ was cleanly dissected out from the adjacent parts, which were carefully removed. At the neck of the bladder the muscular and other fibrous structures which surround the vesical orifice of the urethra were pared away pretty closely, but some very small portions of these were necessarily left, which could not be regarded as, strictly speaking, prostatic tissue. Absolute definition is almost, if not quite, impossible. I was careful, however, to be so exact that any portions of adventitious tissue remaining would be so small as not to invalidate the conclusions drawn. The anterior limit of the organ, although not completely defined, is yet very nearly so; no difficulty, therefore, arises here.

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* Philosophical Transactions, 1806, Paper viii. "An Account of a Small Lobe of the Human Prostate Gland, which has not before been taken Notice of by Anatomists." By Everard Home, F.R.S.

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* De Sedibus et Causis Morborum per anatomen indagatis. By J. B. Morgagni. 2 vols. folio. Venice, 1761. Letter xli. article 18.

† Idem. Letter xxxvii. article 31.

"If you attentively examine those examples which I have pointed out," . . . . "you will observe that they were all from old men; and in like manner, if you examine all my observations in which there was the beginning of an excrescence, you will find that this was found to grow out in the very middle of the internal and upper circumference of the gland, posteriorly; but whether all these things happened by chance, or otherwise, future observations will show."‡

Some considerable time after this that future was realised; Morgagni returned to the investigation of this subject, and the cause of his doing so is of great interest in relation to the present inquiry. It appears that "a celebrated anatomist" of the time (Morgagni refers without doubt to Lieutaud, although he omits all mention of his name, as he states to be his invariable custom when he proves a contemporary to be in error), declared that an eminence at the neck of the bladder was not a morbid growth, but a small part quite natural and common to all bodies, calling it the "uvula vesicæ." Morgagni therefore devotes great part of the sixty-sixth and the whole of the seventieth letters, to the refutation of this view. In the former, stating that during forty-four years as anatomical professor, he had most carefully dissected at Padua sixty or seventy bodies, and found it only in four; that he had made vivisection of a dog for the express purpose of seeking it there, but in vain, and that he had decided that it could be nothing but "a morbid excrescence of the prostate gland appearing in old men," . . . "not rare, but not so frequent." That Valsalva, Pohlius, and his friend Santorini, regarded it in the same light, the latter presenting it in a drawing as a body "prominent in diseased bladders,"* besides referring to it as "a circumstance which is diseased and unfrequent, and does not deserve to be exhibited as perpetual and constant, to the great detriment and misleading of younger practitioners."* The seventieth letter Morgagni devotes to the purpose of giving the result of his forty-fifth year of teaching anatomy, in relation to this very subject, stating that he had dissected in public five subjects, and in none of them, although he had sought most carefully, was there any trace of this "roundish protuberance" or "uvula."

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* The Sepulchretum, sive Anatomia Practica. By Theophilus Bonetus, M.D. Lyons, 1700. Book iii. sects. 24, 25.

† De Sedibus, &c. Letter xlii. article 11.

‡ Idem. Letter xli. article 19. See the English translation by Dr. B. Alexander. London, 1769.

John Hunter similarly regarded it, after independent examinations of the organ, stating that "a small portion of it (the prostate) which lies behind the very beginning of the urethra, swells forward like a point, as it were, into the bladder, acting like a valve, to the mouth of the urethra."†

It seems remarkable, considering the very slight grounds upon which the existence of a distinct third lobe as a normal and ordinary constituent of the prostate, were affirmed by Sir Everard Home, that it should have been so generally received without question by English anatomists to the present day. Its existence is denied by most French observers.

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* Observationes Anatomicæ. By Jo. Dom. Santorini. Venice, 1724. Chapter x., "De Virorum Naturalibus," in explanation of tabula 2, fig. 2, sects. 20 and 22, pp. 201–205.

† A Treatise on the Venereal Disease. By John Hunter. 2nd edit. London, 1788. p. 170.

Cruvelhier expresses the general opinion when he says that the ejaculatory ducts, being received into a groove or channel in the substance of the prostate, a portion of variable size is indicated by them, but that it has no title to be called a lobe. It is not, he says, an isolated piece, and should be called "the median portion."[*]

In an unnatural condition this portion is found enlarged, and then presents an appearance which is not unlike that of an independent lobe, but as this is a deviation from the normal state, the use of the term to the healthy part appears to be indefensible, and I shall in future speak of it by the term already proposed, viz. that of "the posterior median portion."

Weight and Size.—From thirty-three healthy adult prostates which I very carefully weighed and measured, the details of which may be found in a table at the end of this chapter, the following results were ascertained. The *prevailing* weight of the organ corresponded very closely with the *average* weight; the latter being 4 drachms and 38 grains; or, in round numbers, rather more than four drachms and a half. This is lower than is usually stated in anatomical works, where it is often represented as from 6 to 8 drachms.

Measurements.—The transverse diameter is almost always the greatest, exceeding the antero-posterior by a fifth or a sixth. These relations vary very much. Sometimes the organ has an appearance as if it had been compressed from before backwards. Much less commonly is the transverse measurement decreased. The usual measurements given in anatomical works were corroborated by these inquiries.

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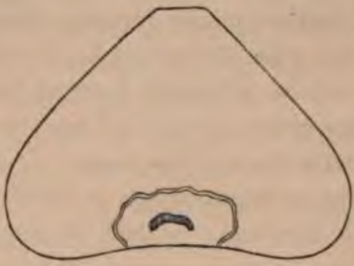
[*] Anat. Path. du Corps Humain, livr. xvii. p. 3. Paris, 1835-42. Par J. Cruvelhier.—See also Traité d'Anat. Path. Générale. Tome 3^{eme}, p. 46. Paris, 1856. By the same. Langenbeck also takes the same view.—Neue. Bibl., b. i. p. 360. Hanover, 1818.

They may be expressed in average terms as follows:—

From base to apex	1¼ to 1½ inch.
Greatest transverse diameter, about ..	1¾ do.
Greatest thickness, about . . .	⅝ to ⅞ do.

(See fig. 1.)

Fig. 1.



These are smaller than those given by Dupuytren, who represented, in connection with the subject of Bilateral lithotomy, the prostate as measuring twenty to twenty-four lines transversely, and ten to twelve in thickness; and on these estimates his calculations for that operation were based.*

The measurements given above, correspond very nearly with those by Deschamps,† Senn,‡ and Dr. Gross,§ all of whom have made considerable practical researches with a view to the question of size. Since the above-named observations have been made, a very extended and admirable account of the anatomy of the prostate by Dr. Decimus Hodgson, of Glasgow, has appeared; || and I am gratified to remark the coincidence in relation to the subject of weight and size, which obtains between our observations respectively.

The important result to be derived from measurement, as

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* Mémoire sur l'Operation de le Pierre. Paris, 1836. p. 21.

† Traité Historique et Dogmatique de l'Opération de la Taille. Paris, 1796. Vol. i. pp. 39, 40.

‡ Traité Anatomie Chirurgicale. Paris, 1838. Vol. ii. pp. 327–330. Par J. F. Malgaigne.

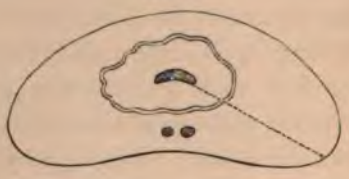
§ Diseases of the Bladder, &c. Phil., 1855. 2nd ed. p. 69.

|| The Prostate Gland, and its Enlargement in Old Age. London, 1856. p. 34.

regards Lateral lithotomy, is the length of a line directed downwards and outwards from the centre of the urethra (which may be regarded as corresponding in the operation with the bottom of the groove in the staff) to the outer border of the organ at its vesical extremity. This line may be considered as falling midway between the horizontal and vertical planes, forming with each, therefore, an angle of 45°, when the patient lies in the position for lithotomy. It may be accurately deduced from the form and measurements given above, and has been verified by numerous actual sections of the organ.

Average measurements of healthy prostate in direction described (see fig. 2) . .	$\frac{7}{8}$ of an inch.
Ditto, of small prostate, weighing under 4 drachms	$\frac{3}{4}$ of an inch.

FIG. 2.



This, it will be understood, represents the distance to the extreme border; the extent therefore to which an incision should be carried in this situation, may be approximately determined therefrom.

INTIMATE STRUCTURE.—The intimate structure of the prostate has only of late years been examined, with the minuteness and care necessary to obtain accurate information respecting it. Formerly it was regarded as a strictly-glandular body, but modern anatomical researches have tended, little by little, to disturb this view, and to present it more in the character of a muscular than a glandular organ. Its parenchymatous structure was first observed to be made up chiefly of the soft, unstriped, or organic muscular fibre;* then it was affirmed by Kölliker that this tissue formed at least two-thirds of the mass, and that the glandular structure, which was very simple in its character, amounted to barely one-third.* More recently, Professor Ellis of University College, after repeated dissections of the part, has come to the conclusion that the prostate has no claim to be regarded as a gland at all, in the sense in which that term is used to classify certain structures in the human body, but rather as a muscular body permeated by urethral glands. He communicated the result of his researches in a paper read before the Medical and Chirurgical Society in June, 1856, and published in the last volume of the Transactions. Upon this the following account of the muscular arrangement of the organ is based.

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* A paper in the Medical Gazette, by Dr. Handfield Jones, Aug. 20, 1847.

The body of the prostate is constructed of organic muscular fibres arranged in a circular manner around its long axis, through which passes the urethra. They are continuous posteriorly with the middle or circular muscular layer of the bladder, so that between this and the prostatic fibres there is no kind of separation or line of demarcation. At the anterior limit of the organ, there is also no absolute distinction between these and the layer of circular fibres surrounding the membranous portion of the urethra, in which situation it is represented as being about $\frac{1}{30}$ of an inch in thickness. The urethra, as it passes through the prostate, has, however, for its immediate covering a thin layer of longitudinal fibres, continuous with the inner or submucous muscular layer of the bladder; the fibres of which layer, in their course to the urethra, form at the neck of the bladder, as they "pass from one part to another, the projection called uvula vesicæ."

Precisely the same arrangement obtains in the female urethra, which corresponds to the intra-pelvic portion of the male canal, excepting only that the circular fibres are much less developed, and the glands peculiar to the male are wanting.

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* Zeitschrift für Wissenschaftliche Zoologie. Leipzig, 1848. Beitrage zur Kenntniss der Glatten Muskeln. By A. Kölliker. p. 48.

"From the above-given anatomical facts," says Professor Ellis, "we may conclude that the prostate is less of a glandular than a muscular body, and is only a largely-developed portion of the circular muscular layer that invests all the urethra behind the bulb or the spongy portion. The existence, too, in the female of a thin muscular stratum in the corresponding position, gives support to the view of its muscular office. As the prostatic enlargement includes only part of the muscular stratum on the urethra, I would propose the name *orbicularis vel sphincter urethræ* for both the prostate and the prolongation around the membranous portion of the urethra; whilst I would confine the old term prostate (without the word gland) to the thickened and more powerful part near the neck of the bladder. The orbicularis may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres, as, for instance, in the propulsion of the seminal fluid."[*]

Professor Kölliker's account of the arrangement of those muscular fibres which belong to the prostate proper, includes not only a description of the circularly-disposed fibres, which are regarded as forming the greater part of the organ, but others also which radiate from the centre outwards to its circumference. Besides these, there is, according to him, an investing layer of tissue composed in part of areolar, but mainly of organic muscular, fibres, prolongations from which layer enter the body of the organ, to become continuous with bands of the same tissue which intersect each other in all directions and support the glandular elements, forming muscular partitions interposed between adjacent glandular masses.*

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[*] Trans. Med. Chir. Society, vol. xxxix. p. 332.

In making a section of a prostate, it may be observed that that part of its structure which lies nearest to its circumference is a little less firm and close in texture, than that which is adjacent to the urethra. It is there that the glandular elements are chiefly found, existing in the form of pyriform or ovoid masses, from $\frac{1}{350}$ to $\frac{1}{150}$ of an inch in diameter. Each is a collection of follicles, or pouches, loosely aggregated together, with elastic tissue interwoven among them. These are lined, for the most part, with small spheroidal or polygonal epithelium cells, which are not unfrequently seen to contain some yellowish matter. They average in size about $\frac{1}{2500}$ of an inch in diameter. Each one of the glandular masses, of which there is a number, according to Kölliker, varying between thirty and fifty, appears to have an independent duct, which takes a course by itself, or after a junction with not more than two or three other ducts, to reach the floor of the urethral canal.† Ramifying among the glandular elements is a close network of capillary vessels. A free distribution of these, with numerous small veins, is also seen underlying the mucous membrane of the prostatic urethra. The larger ducts are lined with columnar epithelium.

The Utricle, or prostatic vesicle, now generally believed to be the analogue in the male, of the uterus and the vagina combined of the female (see page 41), is a recess, the mouth of which corresponds with the anterior part of the veru-montanum, or caput-gallinaginis, seen in the posterior part of the prostatic urethra. Its form is ovoid, or resembling that of a flask, the neck and orifice constituted by the narrow and anterior portion; the body being formed by the somewhat expanded remainder, or posterior, part. The measurement of the entire cul de sac thus described is generally about three-tenths of an inch in length, and about two-tenths at its widest point. The size, however, occasionally varies much. I have seen it nearly three-quarters of an inch long. It was so in No. 14 of the series of preparations referred to. Its walls are made up of connective tissue, and some elastic tissue interwoven with bands of organic muscular fibre, and the cavity is lined with mucous membrane covered by cylindrical epithelium. Several small glandular follicles are imbedded in these structures and open into the cavity. The ejaculatory ducts are contained in its walls, one on either side, and open by narrow orifices at the mouth of the sac. A section is well represented in the upper figure of Plate I., in which instance the ejaculatory duct was slit up, in order to show the course of that vessel as it passes through the parietes of the utricular cavity.

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* Manual of Human Histology. By A. Kölliker. Translated for the Sydenham Society, 1855. Vol. ii. p. 233.

† My own observations would lead me to believe that these small glandular masses exist in a somewhat larger number, and are less clearly defined in form and manner of disposition than has been here represented.

TABULAR VIEW OF THE WEIGHTS, MEASUREMENTS, AND OTHER PARTICULARS RELATING TO FIFTY PREPARATIONS OF THE PROSTATE, DISSECTED BY THE AUTHOR.

I removed the greater part of these from the bodies of elderly people, as they consecutively appeared in the dead-house of a large metropolitan institution, containing a due proportion of healthy and diseased lives; no kind of selection was made, the object having been to obtain them from fair average lives, as occurring in that class of the community which is met with in such institutions.

THIRTY-THREE NORMAL SPECIMENS,

FORMING DATA FOR THE SECTION ON "WEIGHT AND SIZE OF THE PROSTATE," AT PAGE 10.

No.	Age.	Weight.	Length.	Breadth.	Thickness.
		drs. grs.	inches.	inches.	inches.
1.	79	4 48	1·4	1·45	·85
4.	42	3 37	1·3	1·4	·6
5.	47	4 57	1·8	1·7	·65
6.	85	4 44	1·25	1·55	·95
7.	47	5 33	1·4	1·7	·9
8.	63	4 35	1·35	1·7	·7
10.	50	4 34	1·5	1·7	·65
11.	54	4 8	1·25	1·8	·75
12.	90	4 58	1·25	1·85	·85
13.	52	4 13	1·5	1·75	·6
14.	54	4 37	1·5	1·75	·7
15.	66	4 27	1·4	1·5	·65
16.	63	4 3	1·35	1·5	·65
18.	79	4 2	1·4	1·6	·55
20.	54	4 50	1·5	1·7	·7
21.	70	4 55	1·4	1·8	·7
23.	66	4 56	1·4	1·7	·75
24.	74	4 4	1·3	1·6	·7
25.	61	4 16	1·3	1·6	·8
26.	56	3 56	1·25	1·75	·75
28.	21	3 34	1·3	1·4	·7
29.	40	4 30	1·55	1·6	·75
32.	64	5 2	1·4	1·75	·9
33.	50	5 20	1·55	1·75	·8
36.	73	4 48	1·6	1·8	·6
37.	50	4 46	1·4	1·9	·55
38.	46	5 4	1·5	2·0	·55
39.	66	4 35	1·5	1·75	·6
40.	66	4 6	1·5	1·65	·6
46.	65	4 24	1·4	2·0	·6
47.	55	5 30	1·3	1·8	·85
49.	54	4 48	1·4	1·75	·7
50.	61	4 54	1·3	1·75	·75

FOURTEEN PROSTATES ABNORMAL FROM ENLARGEMENT OR TUMOR.

ILLUSTRATIVE OF REMARKS AT PAGE 34.

No.	Age.	Weight.	Length.	Breadth.	Thickness.	In what respect abnormal.
		drs. grs.	inches.	inches.	inches.	
2.	71	6 40	1·65	1·9	·9	General enlargement.
3.	72	5 18	1·3	1·7	·9	Left lobe larger than right.
9.	56	5 22	1·55	1·75	·75	Small tumors, chiefly fibrous ; very little gland structure.
22.	56	6 0	1·3	1·8	1·0	General enlargement.
30.	62	7 15	1·8	1·7	·85	Pyriform outgrowth from posterior median portion. See Plate I.
31.	74	12 30	2·25	2·4	1·75	Full of tumors. Engraved at Plate II.
34.	73	7 15	1·5	2·0	·8	General enlargement, chiefly of posterior median portion.
35.	61	7 25	1·5	1·9	1·0	Ditto.
41.	64	6 20	1·5	1·9	·75	Three small outgrowths from posterior median portion.
42.	75	9 50	1·7	2·1	1·0	General hypertrophy, with several small tumors.
43.	79	4 36	1·3	1·75	·8	No enlargement ; but full of small fibrous tumors.
44.	50	5 50	1·3	1·8	1·0	Small pyriform outgrowth from posterior median portion.
45.	65	6 18	1·5	1·7	1·0	Ditto.
48.	62	6 5	1·4	1·9	1·0	Ditto. Fibrous tumor in each lateral lobe.
THREE, ABNORMALLY SMALL.						
17.	73	2 58	1·1	1·8	·6	
19.	60	2 57	1·2	1·45	·55	
27.	21	2 46	1·25	1·3	·55	Died of phthisis, greatly emaciated.

CHAPTER II.

THE ANATOMICAL CHARACTERS OF THE ENLARGED PROSTATE OF AGE.

Enlarged Prostate presents several Varieties.—Two Classes; Enlargement from Analogous Elements, Hypertrophy; from Heterologous Elements, Inflammatory, Tubercle, Cancer.—The Enlarged Prostate of Age.—Physical Developments of this kind.—Classification of Forms.—Almost all cause Obstruction to Outflow of Urine.—Effects of on the Urethra and Neck of the Bladder.—Centric and Eccentric Enlargement.—Size and Weight of Enlarged Prostate.—Consistence.—Structural Changes of Enlarged Prostate. I. Enlargement depending on General Hypertrophy: 1. Of the entire Structure; rare—2. Of the Muscular Tissue only; distinct from Enlargement due to Inflammation. II. Enlargement due to Limited Hypertrophies, Tumors, and Outgrowths; the most common kind.—Home's Account of Prostatic Tumors: 1. Circumscribed Tumors.—(*a*) simply fibrous—(*b*) the same with Glandular Elements 2. Limited Hypertrophies in the form of Outgrowths.—Analogy between Tumors of Prostate and those of Uterus.—Polypus from Veru-montanum; very rare.—Case.—Cases Illustrative of Defined Tumors in the Prostate.

Enlargement of the prostate may take place as the result of several different pathological actions or processes; and, therefore, presents varieties, possessing very different characters, both as to the course observed in the progress of the disease, and the structures which may be revealed by anatomical examination of the organ after death.

These varieties may be conveniently separated into two different classes.

I. Enlargements, which are constituted by an excessive formation or unnatural arrangement of elements analogous to those of which the prostate is composed.

II. Enlargements, occurring from the deposition of heterologous elements.

The first group comprehends all the forms of enlargement which are commonly represented under the general term of Hypertrophy, and only occurring in advanced years.

The second group includes enlargements from inflammatory effusions, whether lymph or pus; as well as enlargements from tubercular deposit, malignant growths, and cystic disease (?).

The first class presents to us the main subject for consideration; inasmuch as the condition commonly known as Hypertrophy of the prostate, and which occurs only at the middle and advanced periods of life, is a form distinguished as much for the frequency of its occurrence, as most other forms are by their rarity. This chapter will be devoted to its study, while that of the second group will be deferred to a subsequent part of the work, where it constitutes chapters ix., x., and xi.

In considering the anatomical characters which distinguish this variety, those of EXTERNAL FORM and physical development may be first noticed.

Judging from the marked examples of this affection which find their way into our museums, it would not be easy to say what part of the organ, anatomically regarded, first exhibits the disposition to enlarge. Writers, and surgeons generally, seem to attribute it very decidedly to the posterior median portion ("middle lobe" of Home), as well as to regard this as the source of the most considerable development in point of size. The impression may be correct that a preponderance of the kind described exists, but it does not appear to be a large one. As regards the locality of commencing enlargement, I confess I do not think the posterior median portion is much more frequently an earlier "point du depart," than are the lateral lobes; but, as regards the rate of development, the former certainly, as a rule, progresses more rapidly than the latter. At the same time by far the larger number of the preparations contained in four of the principal museums of London, including that of the Royal College of Surgeons, each one of which I have carefully examined, and possess written notes respecting, and amounting to a total of 123 specimens, exhibits about an equal development in size of at least three portions of the organ; that is, of the lateral lobes and the posterior median portion, while in many, the anterior portion is correspondingly enlarged. I have classified the preparations referred to in distinct groups, marked by the direction or situation in which the enlargement is chiefly manifested, a method which will afford the means of obtaining a comprehensive view of the question under consideration.

Common forms of the affection.

I. General enlargement of prostate, that is, both lateral lobes and the posterior median portion pretty equally enlarged, is present in 74 preparations of the 123.

II. General enlargement of prostate, but the posterior median portion enlarged in greater proportion; in 19 preparations.

III. General enlargement, but the right lobe predominating, and very decidedly larger than the left; in 8 preparations.

IV. General enlargement, but the left lobe predominating, and decidedly larger than the right; in 11 preparations.

Uncommon forms of the affection.

V. The lateral lobes only enlarged; in 5 preparations.

VI. The anterior portion only, or chiefly enlarged; in 3 preparations.

VII. The lateral lobes and anterior portion enlarged, not the posterior median portion; in 3 preparations.

The most important result of enlargement, at all events in any of its four common forms, is obstruction to the flow of urine. Very rarely is it otherwise, although there appear to be some cases, few and exceptional, in which the condition of the vesico-urethral orifice is so altered, that the bladder is unable to retain the urine, which consequently runs off as fast or nearly as fast as it enters the viscus from the ureters; a subject which will be more fully discussed hereafter. Admitting, then, that the result almost uniformly met with is *obstruction*, producing more or less retention in many instances, it is obviously one of the most important parts of the present inquiry to ascertain the influence of enlargement upon the form, size, and direction of the urethra; since success in affording relief to retention by the passing of a catheter must depend upon adaptation in the instrument itself, or in the method of applying it, to the mechanical obstacles which a distorted canal presents.

The first effect to be noted is one which is common to all the first four forms of enlargement; viz. increase, sometimes considerable, of the antero-posterior diameter of the prostatic urethra. Associated with this is diminution of its lateral or transverse diameter; so that the canal becomes a narrow or chink-like passage, instead of one which, when distended, is of about equal diameter in every direction. The lateral lobes, increasing, not only encroach laterally upon the canal itself, but gradually carry upwards that portion of the urethral wall which is constituted by themselves, and that to such an extent that I have seen the slit-like opening produced by transverse section in such a case, measuring three-fourths of an inch from the pubic to the rectal limit of the urethra.

The length of the prostatic urethra is also materially increased by the same forms of enlargement. The increased magnitude of the encompassing body in every direction, involves an addition to the length of the passage which passes through it. This would of course be the case were that passage continued in its ordinary straight direction. But it is often rendered tortuous also, which further contributes to the augmentation of its length. In some preparations which I have examined, the urethra has measured three inches from the orifice of the bladder to the membranous portion, instead of one inch and a half, which is the normal length.

The next effect is a deviation from the natural direction; and this varies with each form of enlargement noted. Thus, where there is enlargement of, or outgrowth from, the posterior median portion, the form of all kinds most generally present, a change in the direction usually commences about the middle of the prostatic urethra, its posterior wall being carried upwards, or upwards and forwards, in the erect position of the body, producing a more or less angular curvature in the place of a nearly straight line. Examples of this deviation are shown in the adjoining figures, which, although diagrams, represent in profile the form of the actual specimens from which they were taken (figs. 3, 4, 5, and 6). The direction, in early stages of enlargement, is usually more or less that of a simple curve, but in more advanced stages it may be almost angular, so that in some instances a complete step has to be surmounted at the neck of the bladder, before an instrument will enter the cavity (figs. 4 and 6). Now, when as-

Fig. 3.

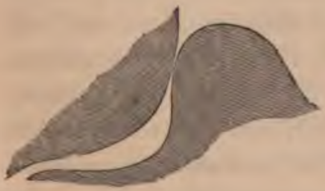


Fig. 4.

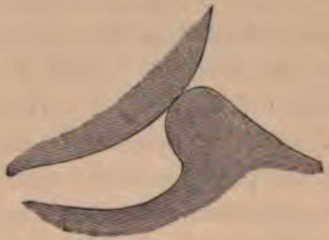


FIG. 5.

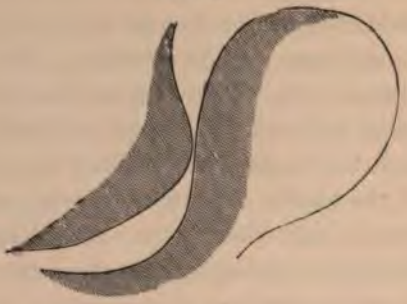
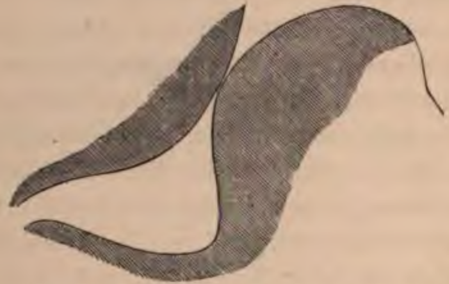
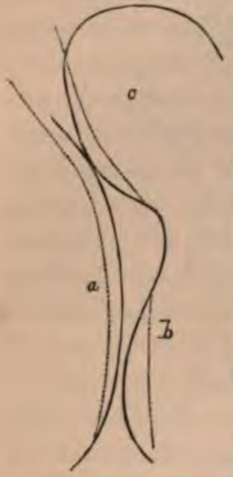


FIG. 6.



sociated with this development of the posterior median portion, there is a predominating enlargement of either lateral lobe, it is obvious that the lateral direction of the canal will be also changed. Thus if the right lobe predominates, there will be a lateral curve of the urethra, the convexity of which is presented to the left, and *vice versâ*. And as the predominating lateral lobe is almost always found in connection with a large posterior median portion, and is usually more or less blended with it, the direction of the urethra will be upwards and to the right, or to the left, as the case may be (fig. 7). Sir E. Home, up to the date of publication of his first volume on the prostate gland, had never seen predominating enlargement of the right lateral lobe, and he inferred, as a rule of some importance in relation to the introduction of catheters in enlarged prostate, that such an enlargement, and by consequence, that a deviation of the canal to the left, either did not occur or was extremely rare. He met with an enlarged right lobe, however, before the publication of a second volume on the same subject, but still regarded it as uncommon, and in this light it has been viewed, I observe, in the latest works on this subject. There is, however, no ground for supposing that there is any difference in the liability of either lobe to the affection, since among the existing specimens the predominating lobe is to be found in nearly equal numbers to the right and left respectively. But in the absence of any predominance of a lateral lobe, where the median portion is largely developed, a similar kind of deviation is often met with, only it is not necessarily confined to one side, but may exist equally on both. The vesical end of the urethra being divided by a large median outgrowth of pyriform shape, a passage is left on either side of it, giving to the canal there the form of the letter Y (figs. 8 and 9). In these diagrams, drawn, like the foregoing, from actual specimens, the line which the catheter must take is indicated by dotted lines. And the degree of vertical direction associated with it frequently depends upon the amount of mucous and submucous tissue drawn up by the growth, on each side of which, at the vesical orifice, it forms a kind of semicircular bar. It is hardly necessary to allude to the importance of calling to mind, when instrumental aid is

Fig. 7.



a. Right lobe of prostate, considerably enlarged.
b. Left lobe, less so.
c. Tumor from posterior median portion blended with left lobe, and consequently deflecting the urethra to the right side. The course which an instrument must take in such a case is indicated by dotted lines.

required, the frequency with which lateral deviation is found to exist in largely-developed forms of prostatic obstruction.

FIG. 8.

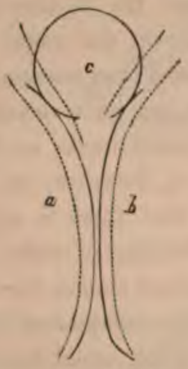
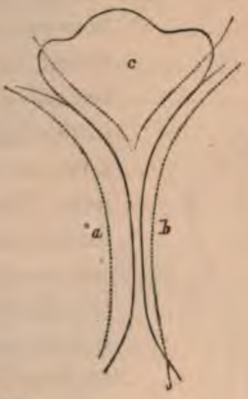


FIG. 9.



a Right lobe. *b* Left lobe.
c Posterior median portion ("middle lobe").

The next deviations are those to be observed in the form of the internal meatus, or vesico-urethral orifice, which in its healthy condition is too well known to require description. When, however, the posterior median portion is predominant, the vesico-urethral orifice acquires a crescentic form, the convexity of which is directed upwards. When the right lobe considerably exceeds in size the left, the crescent has its convexity to the left side, and so on. In some preparations, where two or more irregularly-enlarged lobes are combined, the orifice is very much distorted, presenting an elongated and tortuous outline. Sometimes it appears to be overlapped altogether when an outgrowth from the posterior median portion affects a valvular form, or has a narrow peduncle. In these circumstances, which, however, are not very commonly met with, the valvular portion appears to be forced against the neck of the bladder by the effort of micturition, and the obstruction rendered still more complete.

It occasionally happens, but very rarely, more so than has been supposed by some continental authors of note, that one result of prostatic enlargement is undue patency, and not obstruction, of the urethro-vesical orifice, and this circumstance, regarded, as it has been, as not infrequent, is supposed to explain the occasional occurrence of genuine incontinence, the bladder being empty, in the place of retention of the urine. Submitted to the test of extended anatomical research the supposed fact disappears, and consequently the theory based upon it. First, it is very rare to find expansion of the internal meatus. Secondly, when it does occur, it is almost invariably associated with distended and hypertrophied bladder, proving incontestably that obstruction was present during life, and that retention, not incontinence, was the result.

The expansion of the vesico-urethral orifice, supposed to prevent the bladder from retaining urine, is accounted for in the following manner:—The lateral lobes being considerably enlarged, the tumor of the posterior median portion, instead of projecting backwards into the bladder in the usual manner, enlarges between the hinder parts of the two lateral lobes themselves, and opens them out as by the action of a wedge, giving to the meatus an expanded and triangular appearance. I have carefully examined the histories attached to preparations exhibiting this peculiarity, and where these have been wanting have verified the existence of a hypertrophied and distended bladder, and in no instance have I been satisfied that real incontinence, that is, unassociated with retention, existed during life. Anterior to the vesical orifice, it may further be added, there is usually a sufficient degree of encroachment of the lateral lobes upon the canal to produce considerable obstruction and habitual retention of urine. I do not dispute that there is ground for supposing that the alleged result may occasionally exist; the frequency of its occurrence, however, I have no hesitation in denying.

But there is another point of view from which the development of the enlarging prostate may be regarded. The tendency is, in some instances, strongly manifested in a direction towards the centre of the organ, or the neck of the bladder. In others, it appears to affect an opposite direction, to become developed very largely at its periphery. In the former, which may for brevity's sake be denominated *centric* hypertrophy, the outflow of urine may be very materially obstructed before the prostate has increased much in the matters of weight and size. In the latter, which may be described as *eccentric* or peripheral, a very large development may take place, and an enormous prostate may be encountered in the rectum, and yet little obstruction to the course of the urine will be manifested. This, it is almost unnecessary to remark, is a form far more favourable for the patient than the other. I have had several opportunities of observing the contrast which cases belonging to these two classes present to each other. It lately occurred to me to have the opportunity of examining a very striking example of the latter kind. The case was that of an elderly gentleman, for whom on one occasion in consultation I passed a catheter. He expelled his urine very frequently, and with difficulty, but emptied the bladder completely. There was no residual urine on introducing the catheter after the act of micturition; a fact verified, not only by myself at the time referred to, but by his ordinary attendant on numerous occasions. Nevertheless, the prostate formed an enormous tumor in the rectum, presenting an unusually marked example of enlargement there when digital examination was made.

The size and weight attained by hypertrophied prostate are sometimes remarkable. A prostate measuring two inches in a transverse direction, and one inch in thickness from before backwards, or which weighs an ounce, must be considered hypertrophied. On the other hand, a transverse measurement of three inches is not uncommon. I have seen one exceeding four inches and a quarter, but such a degree of enlargement is extremely rare. The weight has been known to reach twelve ounces. In malignant disease even these limits are exceeded.

The consistence of the organ varies somewhat. It is sometimes firmer and harder in texture, at others a little looser and softer than in the natural condition. It usually presents the former character when numerous fibrous tumors are imbedded in its substance. Generally speaking, I think the consistence does not vary much from that found in health. Inflammation probably exerts some influence in respect of consistence, but not much. Enlargement, which is purely the result of inflammatory action, is, of course, altogether excluded in a consideration of hypertrophy.

The outline of the enlargements themselves, although affecting generally oval or spheroidal forms, is nevertheless often seen to be extremely irregular. The surfaces present an uneven, bosselated appearance, or even very marked or independent projections are seen arising from them. A close inspection will render evident to an unpractised eye that this irregularity is due to the existence of rounded bodies, either entirely or partially imbedded within the substance of the organ, and projecting into the bladder, not merely from the posterior median portion, but also from the lateral lobes into that cavity. They may similarly project from any part of the prostate, as at its peripheral boundary, or into the urethra. The nature of these tumors will be discussed hereafter.

THE STRUCTURAL CHANGES developed in the enlarged prostate of advanced age.

The histological elements which constitute the structure of enlarged prostate are identical with those which compose the organ in the healthy state. There are in the former state differences in the relative proportions to each other of the component tissues, and also in the manner of their arrangement. These tissues may be classified as the Glandular and the Muscular. In the vascular and nervous supply no change in relative proportion to other parts has been verified.

The first-named or Glandular structure includes the cells and cell contents, the crypts or follicles, and the ducts, which, combined, form the secreting apparatus of the organ.

The Muscular tissue, as already seen, forms the chief component structure throughout every part of the prostate. It is that form which is familiarly known as the organic, pale, or involuntary muscular fibre. Associated with it here, as in all other organs, there is a certain proportion of connective and elastic tissues. This is always understood to be included whenever the term muscular is employed, in order to distinguish the basic portion of the prostate from the glandular elements which are intermixed.

From a close examination which I have made of a large number of prostates, both normal and enlarged, I think the latter may be regarded as exhibiting certain forms, depending upon the development and mode of arrangement of these two component tissues, and that these forms may be conveniently classified in the following manner:—

I. Enlargement depending on general hypertrophy; that is, affecting the whole, or, at least, a considerable part of the prostate.

1. Affecting the entire structure of the organ.
2. Affecting the muscular tissues only.

II. Limited hypertrophies in the form of tumors and outgrowths.

1. Circumscribed tumors of the prostate.
2. Outgrowths.

All the varieties of deviation from the normal state, although thus arranged for convenience of study, are more or less related one to another through a series of almost insensible gradations. And I know no other mode of classifying the phenomena that are presented to us here, which does not exhibit the same imperfection. The method adopted, therefore, has for its object to indicate typical forms, around which may be grouped with more or less certainty all or almost all of the cases which are presented to the observer.

I. Enlargement of the prostate depending on general hypertrophy; that is, affecting the whole, or, at least, a considerable part of the organ.

1. Affecting, not any one or two of its component elements, but the structure proper of the prostate in its entirety.

The prevailing weight of the healthy adult prostate being 4½ drachms, it does not follow that material addition to this weight in any given case is to be considered abnormal enlargement. The question, however, must be entertained, what is to be considered as the maximum limit of weight, addition to which may be regarded as certainly proving the organ to be abnormally enlarged?

I should say in reply that I have never seen a prostate, treated after the manner already described (p. 5), weighing more than 6½ drachms, that was not obviously the subject of undue development in one or more of its parts; and I think that 7 or 8 drachms would be invariably an abnormal weight.

But general structural enlargement, that is, true hypertrophy of the prostatic substance proper, affecting the whole organ, must be excessively rare. Almost all the specimens I have examined above the weight named, exhibit either local developments to an undue extent, or increase of the basis or stroma, and not of the glandular element. It is by no means an easy matter to decide absolutely upon the existence or non-existence of the condition in question in any particular case.

That true hypertrophy of the substance proper may affect a portion of the organ only, appears to be probable; a hyper-development, that is, of all the structures of that portion, the adjacent portions being unaffected by any such action. Such an affection of a lateral lobe as a whole, for example, distinctly belongs to this class. Isolated fragments of a lobe, however, may be the subjects of a similar development. But here we approach the division of "Outgrowths;" the fact of the unduly-developed portion being altogether situated within the boundary line of the organ, and not extending beyond its periphery, can scarcely be regarded as removing it from that category, with which it seems to link the present class. It is a condition much more common than general hypertrophy, and may be considered subsequently with the subject of outgrowths.

2. Enlargement due to increased development of the muscular tissues only.

This appears to be the constitution of many specimens of enlarged prostate met with among elderly patients. An example of this kind, no distinct tumor-formation being present, or, if so, forming but a small proportion of the overgrowth, is found to consist mainly of hypertrophy of the non-glandular elements. The bands and strata of muscular tissue are considerably larger than natural, and may be seen under the microscope, forming intersecting partitions of greater size and distinctness than usual, between the glandular crypts and ducts, which appear in consequence more isolated. In a section of a lobe the small glandular portions appear to the naked eye of a yellowish tinge, while the larger intersecting portions are of a grayish-white. Thin slices of very considerable size may be made, which, when examined by the microscope, are seen to be destitute of glandular elements, or otherwise to possess but a very small proportion. This condition is much more clearly seen in the lateral lobes, as a rule, than in either of the intermediate portions. Dr. C. H. Jones appears to have been the first to point out the fact that senile hypertrophy was frequently due to increase of the fibrous element rather than of the glandular,* and this has been verified many times by my own observations.†

It is hardly necessary to observe that this form is to be distinguished from that enlargement which results from inflammatory action, and which is considered by itself in the ninth chapter. That action produces a deposit of its own proper products, but there is no reason to believe that it has any power to generate the natural muscular structure of the prostate. This product is a true hypertrophic formation; while the lymph of inflammation is the result of a morbid effusion, and as such becomes in course of time in part removed by the unassisted efforts of nature.

II. Enlargement of the prostate, constituted by limited hypertrophies in the form of tumors and outgrowths.

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* Medical Gazette, August 20, 1847.

† It is this form of enlargement to which the term parenchymatous hypertrophy has been applied, and particularly by Dr. Hodgson, of Glasgow, in his excellent monograph on this subject lately published. My objection to the use of the term parenchyma is, that hitherto it has been applied only to the connective tissues which support the glandular elements in a secreting organ of some kind—the liver or the lung, for example. Not viewing the prostate as analogous with any of the viscera regarded as glands, but as a *muscular* organ permeated with glandular elements of a simple form, I prefer not to employ a term which is grounded upon the assumed existence of such an analogy.

The presence of tumors imbedded in the prostate of advanced age has been already referred to. It is much more common than is, I suspect, generally believed. Sir E. Home observed them, and suggested that they were probably apoplectic clots, marking the occurrence of internal hæmorrhages, to which he believed the organ extremely liable. Their presence may be noted in not less than seven specimens out of ten, engraved in the second volume of his work on the prostate, by inspection of the illustrative engravings only. Cruvelhier describes them, from his own dissection, minutely, and regards them as distinct glandular formations, surrounded by muscular tissue like that of the gravid uterus.* After an examination of a very large number of morbid preparations I have come to the conclusion that enlargement is not merely very frequently associated with the development, more or less marked, of such growths in some one of the forms described, but that the production of defined tumor or outgrowth is, much more frequently than otherwise, the essential element of the pathological condition generally known as hypertrophy of the prostate. Of the fifty prostates which I examined, the particulars of which are arranged in a table at the end of the preceding chapter (see page 18), fourteen were affected with unnatural development in one form or another. Of these, six exhibited numerous isolated tumors in the substance of the lateral lobes. The others show outgrowths, single, binary, or multiple, springing from the posterior median portion.

Of seventy specimens of enlarged prostate in the Museum of the Royal College of Surgeons, in seventeen the isolated tumors are so clearly discernible, that the careful observer cannot fail to see them in the preparations as they stand in the containing vessels. There can be no doubt that many more would be found similarly affected, could the test of dissection be applied. In a large proportion of the remaining preparations there is a pyriform outgrowth from the posterior median portion.

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* Anat. Path. Paris, 1829-35. Livr. xvii. p. 3.

Leaving the subject of outgrowths for the present, we may study—

First,—the circumscribed tumors of the prostate.

Two varieties are met with—

a. The simply "fibrous" (muscular) tumor.

b. The "fibrous" tumor, containing also glandular elements.

a. The simply "fibrous" (or muscular) tumor.

It is necessary to state that I use the word "fibrous" in order to denote these tumors, because it is the term at present conventionally applied to analogous formations in the uterus and elsewhere. It is not a good term, is very liable to convey erroneous impressions, and is not at all universally understood to imply the same thing. In the prostate, as in the uterus, it designates that organic muscular fibre, with a small proportion of connective tissue, already spoken of as forming the basis or stroma of both organs; and such is the constitution of the tumor in both; which is not made up of the fibrous tissue of the anatomist, as its name would appear to imply. It is employed here solely for the sake of avoiding the confusion which accompanies new nomenclature, but with care to premise that it is understood to indicate the characters, and no others, which have just been given. The size of this variety is seldom much larger than that of a large pea, often much smaller. It is sometimes firmer in consistence, and generally of a lighter colour than the surrounding prostatic substance. If a section is made, the surface of the tumor projects slightly from that of the surrounding part, as if it had been hitherto compressed within narrow limits. It appears to be sometimes completely isolated. I have occasionally detected the point at which vessels enter, or at which there appears to be some continuity of tissue between it and the organ in which it is imbedded, but it seems not to be endowed with much vascularity. There is sometimes, but not always, according to my experience, a special enveloping cyst. The tumor is very easily enucleated, and then exhibits a smooth surface, and a form slightly ovoid and usually somewhat flattened. Occasionally it projects considerably from either lateral lobe into the cavity of the bladder, carrying with it an enveloping layer of the prostatic substance. Microscopical examination shows it to be made up of closely-packed organic muscular fibres, with some areolar or connective tissue. The fibres appear to be sometimes arranged in concentric circles or whorls, which are characteristic, and have been frequently described and figured as peculiar to those fibrous tumors, the type of which that found in the uterus is considered to be.* But this I believe to be rare.

b. The fibrous tumor, containing in addition a small proportion of glandular elements.

This may be imbedded in the organ, and be completely isolated by an enveloping fibrous capsule. The enclosed mass is not necessarily a perfect example of glandular substance, but has generally been observed to consist of the ordinary muscular elements, with varying proportions of more or less imperfectly developed follicles or pouches, resembling those of the gland proper. Some analogy is thus suggested between these formations and those limited hypertrophies of the mammary gland which are frequently met with, and which exhibit various degrees of partially-developed gland tissue. Rokitansky pointed out this analogous character in some of the prostatic tumors, from an examination of certain small detached masses which he has observed lying near to the prostate, and discovered to exhibit complete correspondence with it in structure. He compares them to bodies which are frequently observed to be similarly related with the enlarged thyroid gland.* These prostatic tumors vary in size from that of a pea to a large nut, rarely being larger, or indeed quite so large as the last-named. Although these tumors appear at the commencement to be imbedded in the body of the prostate, they may subsequently project considerably from the surface towards the cavity of the bladder. They may thus arise from either lateral lobe, or from the posterior median portion, and assume the form of a polypus, but this is exceptional, as the appearance referred to is much more commonly the result of an outgrowth of tissue, and not of a distinct tumor-formation. Still the condition is one that has been verified in more than a single instance. Sometimes the outgrowth from the median portion may contain in its own substance isolated fibrous tumors of small size. Several examples of these tumors and also of those which are purely fibrous, have been recorded and described during the last few years, some of which are briefly referred to at the end of the present chapter.

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* *Vide* Gluge, Atlas der Patholog. Anat., part iv., tab. 4, figs. 14 and 15. Also Bennett on Cancerous and Cancroid Growths, under the head of Desmoid Tumors, p. 188

Although separating the two varieties in this manner for facility of classification, it is more in accordance with a true view of their character and conformation, I believe, to regard the two typical varieties as the extremes of one class. The two certainly merge into each other very imperceptibly at their adjacent limits, the last-considered variety approximating to the simply-fibrous tumor by insensible gradations; so that some tumors, which appear to be purely fibrous at first, may be found to exhibit slight traces in some parts of their structure, of the glandular elements. In all however, their basis is the muscular fibre, and this fact gives them a distinctive character.

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* Zur Anatomie des Kropfes. Vienna, 1849. p. 10.

Secondly. Limited hypertrophy of the prostate in the form of distinct outgrowths from the substance of the organ.

We have already seen that an independent and limited portion of the prostate may exhibit undue development, while surrounding parts are either but slightly or not at all affected by any such action. The outgrowth from the posterior median portion is the most familiarly known example of this. It is then generally composed for the most part of the ordinary structures of the prostate, although sometimes containing a smaller proportion of the secreting elements than a portion of the organ in the normal state, and it appears to enjoy activity of function in common with the rest of the prostate. It assumes a pyriform shape even in its earliest stage, and is always continuous in structure with the adjacent prostatic tissues from which it springs. Often single, there are sometimes two or even three such outgrowths, apparently simultaneously developed from this part. One usually predominates, and ultimately entirely or partially obscures the others. It has its own special ducts, which traverse the pedicle to open in the urethra, and in its substance may be almost invariably detected those concretions which are found in the adult prostate. It may vary in size from that of a pea to that of a middle-sized pear, and at the outset exerts a perceptible influence on the neck of the bladder, the lower or posterior border of which is gradually elevated as it increases. Ultimately it finds its way into the cavity of the viscus, where it is truly polypoid in shape.

Occasionally this pyriform mass is connected to the main body by so long and slender a pedicle, that it appears at first sight to be a separate or outlying portion. Such was the case with prostate No. 30 of the series at the end of the first chapter, and in two instances referred to at the close of the present chapter (page 49).

The glandular structure of these outgrowths is generally, as might be expected, more perfectly developed than in the isolated tumors. Concretions, as just stated, are commonly found in various stages of progress imbedded in the former, but I never found this to be the case in any of the latter; and the reason appears obvious. In the one case there is an actually-secreting structure with ducts of exit in a state of activity; in the other the structure is rather an imitation, or imperfect development, of a secreting apparatus, and consequently it cannot be supposed that any functional office is performed by it.

Hypertrophy by outgrowth, although most common in the part described, is not invariably confined to it. A projecting growth may occasionally spring from the posterior part of either lateral lobe, and has been even observed to arise from that part of the prostate which lies above or anterior to the vesical orifice of the urethra.

It must not be overlooked that general hypertrophy of the tissues of the prostate may, and commonly does, co-exist with tumor or outgrowth—almost invariably with the latter. And, doubtless, the outgrowth is only a more marked expression of the same disposition which pervades the whole organ, but, not improbably, determined by the form and nature of the cavity towards which the protrusion is directed; the existence of the cavity of the bladder probably permitting a development which would not be possible in other directions, where masses of solid structure oppose such extension. With circumscribed tumor, also, there is often general hypertrophy, but not invariably. A prostate of average weight may be full of these bodies of very small size, but which from some unknown circumstances had not come to be further developed. It follows that in such a case atrophy of the prostatic tissue proper must have occurred. An example was found in No. 43 of the series.

A consideration of the facts exhibited under the subject of tumors and outgrowths, serves as an appropriate introduction to the remark that analogies of a very remarkable kind exist between the characters and relations of these two forms of tumor and those which affect the uterus. Velpeau suggested the idea some years ago. His views may be found in the Leçons Orales,* and in other of his writings. He rested the analogy upon the correspondence which he assumed to exist in the two sexes between the uterus and the prostate, from a belief that the two organs originated from the same centres of development in the early condition of the ovum, coupled with the fact that both are liable, in after life, to exhibit tumors presenting similar external characters.

The ground of analogy, which is derived from regarding the uterus of the female and the prostate of the male as the morphological equivalents in the two sexes, is not, perhaps, the strongest that might be adduced. I shall indicate one which I think is still more conclusive, as well as other points of analogy, the combined result of which will render the correspondence more obvious.

Firstly,—In studying the typical plan on which the entire genito-urinary apparatus of the two sexes is constructed, the most recent labours of modern philosophical anatomists confirm the view that the analogue of the uterus, or rather of the uterus and vagina combined, in the male, is the prostatic vesicle or utricle. This is the view taken by Leuckart in a recent article written for the Cyclopædia of Anatomy and Physiology. It has been also maintained by Dr. Simpson, in a very elaborate "Memoir on Hermaphroditism and Sexual Malformations generally," which first appeared in the same work, but which he has just republished, with considerable additions, in the second volume of his "Obstetric Memoirs and Contributions," edited by Drs. Priestly, of London, and Storrer, of Boston. An extract from this is appended in a note below.[*] The prostate then, although not of itself the absolute equivalent of the uterus, contains it in the utricle, situated as this cavity is in the very centre of the organ.

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* Tome 3eme. Paris, 1841. p. 478.

Secondly,—The point, however, on which I would lay greater stress is, that the prostate and uterus are organs whose bulk is constituted by the same tissue, namely, the organic muscular fibre. No other organ in the body besides these two is similarly constructed by thick masses of this structure; elsewhere it is distributed in membranous layers. This analogy of structure is, perhaps, in relation to the pathological question before us, stronger than that of identity of origin in early fœtal life, since it has more influence, doubtless, in determining the appearance of tumors and outgrowths of similar character, than any other circumstance.

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[*] "Few, or indeed none, of the eminent anatomists who have in later years studied the subject of the prostatic vesicle or utricle, as Huschke, Leydig Rathke, Leuckart, Bischoff, Arnold, Wahlgrew, Kölliker, Duvernoy, Goodsir, and Allen Thomson have at all doubted that this organ is a representative or analogue in the male organisation, of the genital canals of the female.[*] But different opinions have been expressed as to whether it morphologically represents the vagina, or the uterus, or both. H. Meckel at one time, and in opposition to almost all other authorities, suggested and maintained that it was the analogue of the vagina, rather than of the uterus. Weber considered it as the male prototype of the female uterus; and still more lately Bimbaum and Leuckart have shown that this organ may be more truly held as the morphological equivalent of the whole sinus genitalis, both the uterus and the vagina—an opinion now generally shared in by those who formerly took a different view of the subject. Huschke has sometimes found the lower or vaginal portion of the male utriculus separated from the upper and dilated end by a constricted point, as if indicating its division normally into uterus and vagina. Indeed, it is only in accordance with this last doctrine that we can understand the relative positions and modes of junction of the genital and urinary canals in some monstrosities, and the fact of the great variety of forms and shapes which the male uterus or prostatic vesicle assumes when it is found—as so often happens—preternaturally enlarged and disproportionately developed in different kinds of hypospadiac and hermaphroditic malformation."

[*] "Some of the various diseased states attributed to enlargement, &c., of the third lobe of the prostate gland will be yet found, I believe, to be morbid states of this prostatic vesicle. To the minds of some, 'the Investigation of the Diseases of the Male Uterus' would appear to be almost a paradox in thought and words."—Vol. ii. pp. 318, 319. London, 1856.

Thirdly,—The two organs thus similarly constructed, are very frequently the subjects of tumors, identical both in external and histological characters. Thus, in the uterus we find these formations nearly or completely isolated, made up of organic muscular fibres, with connective tissue, imbedded in the substance of the organ, or standing out in relief from either surface.* In the prostate we meet with precisely the same tumors, and they are similarly disposed. Although, on the high authority of Rokitansky before referred to, an analogy has been pointed out as existing between these imbedded tumors of the prostate and those of the mammary gland, I confess that the grounds of that analogy appear to me less complete than those which indicate their relation to the fibrous tumors of the uterus as just suggested. The prostate differs very materially from the mamma (and, in a corresponding degree, resembles the uterus) in being mainly constituted by tissue, designed to exert a mechanical power; while the mamma is simply a secreting organ, or gland. The prostate is a muscular organ, but permeated by glandular tubes and follicles. Were the small glandular tubes found in the inner wall of the uterus, prolonged more deeply into its substance than they are, the analogy between the uterus and prostate would be complete. The organic muscular tissue appears to have a tendency to become the nidus of isolated masses of like tissue, in structures formed by it; the type of these being found in the uterus. In the prostate we have the same phenomenon, plus certain imperfectly-formed gland-tissues, but the addition may be fairly regarded as an accident, depending on the presence of glandular elements in the muscular organ in its normal state. Hence the amount of gland-tissue so intermixed with the tumor is extremely variable in different specimens. The fibrous tumor, we know, in whatever part of the body it occurs, is very prone to imitate in some measure the tissue in which it is placed. Thus, as Mr. Paget remarks, spiculæ of bone may be frequently observed, when it is situated in bony structures;* a disposition which, I believe, accounts for its acquisition of some gland-elements when it appears in the prostate.

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* Vogel established this fact in relation to the structure of the so-called fibrous tumors of the uterus in 1843, and it has been confirmed by Dr. Oldham, Dr. Robt. Barnes, Dr. Bristowe, and others.

Fourthly,—In the uterus we are familiar with another form of tumor, which, springing from the interior, and forming a polypoid growth there, is much more intimately connected with the uterine structure than the variety just described, perfect continuity of tissue existing between it and the polypus. So from the posterior median portion of the prostate we meet with an outgrowth, tending in form to become truly polypoid, which continues its development in the direction of least resistance, and exhibiting complete continuity of structure with the prostate itself. It contains also the glandular elements proper of the organ in varying proportions.

It may further be observed that all these outgrowths and tumors, among the latter especially those of the fibrous kind, may remain of so small a size, both in the uterus and in the prostate, that the bulk of the organ is not sensibly increased, and no signs indicating their existence during life are produced; while on the other hand they may increase to an enormous extent, so as to exceed by very many times the natural size and weight of the organ in which they originated, and give rise to the most alarming derangements of function.

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* Lectures on Surgical Pathology, vol. ii. p. 136.

Fifthly,—The two organs are subject to considerable hypertrophic enlargement, mainly consisting of their constituent fibrous elements. And in both, this condition may be associated with some tumor-formation, or it may exist independently of it. In the latter case, the hypertrophy may be general or local, affecting the whole or certain parts of the organ; and, when thus local, affecting particular spots more commonly than others. All these remarks apply equally to the prostate and to the uterus.

Sixthly,—The two organs are liable to these changes after the prime of life has passed. Bayle, whose observation is quoted by Rokitansky, and verified by Dr. Robert Lee, says that 20 per cent. of women after 35 years of age, have fibrous tumors of some size in the uterus.* I have found prostatic tumors in 30 per cent. of males after 50. In women, however, the tendency to this formation declines after 50, although it cannot be said to cease. Nevertheless it is exceptional after that period. It is generally regarded as most active during the term of uterine functional activity, or rather during the latter moiety of the time. The age at which the reproductive function of man is most vigorous is certainly not that at which a like tendency in the prostate is evinced; but on the other hand it may not be forgotten that the term of productiveness is not limited in the case of the male, as in the opposite sex. And still further, it may, I think, be fairly admitted that our acquaintance with the prostatic function is not at present sufficient to forbid, but on the other hand rather to encourage, the supposition that it is possible, that its activity may not in any way diminish, if it be not augmented, during the middle and later years of life, when the hypertrophic disposition is manifested. One thing is certain, the prostatic secretion, whatever its purpose, does not appear to be at that time less plentiful, judging from the state of the organ after death, than at any previous age.

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* Rokitansky makes the age still later. Fibroid tumors of the uterus, he says, "are unusual up to the thirtieth year, and present themselves most frequently shortly after the fortieth year."—*Manual of Patholog. Anat., Sydenham Soc.*, vol. ii. p. 298.

There is one form of tumor, or rather of outgrowth from the prostate, the occurrence of which is extremely rare, but which may be mentioned before closing the chapter. It has no relation to any of the preceding varieties. It is a polypus springing from the veru-montanum. I know of three instances only. The first in the museum of St. Thomas' Hospital, No. BB. 8, a small polypus about half an inch long, and two lines in breadth, springing from the veru-montanum in a child, and directed backwards towards the neck of the bladder. The second is mentioned by Rokitansky, but not described, as a solitary case which he had seen.*

The third occurred in my own practice, and was exhibited by me at the Pathological Society of London last year.†

It was about five-eighths of an inch in length, soft in consistence, and at its base was continuous with the apex of the veru-montanum, lying in the urethra, which it appeared to fill, and reaching to the neck of the bladder. It was composed of the elements of fibro-cellular tissue, with a few organic muscular fibres intermingling at its base. In some parts were seen near the centre of the growth some minute crystal-like bodies, having very much the appearance of uric acid, yellowish in tint, and rhomboidal in form, with a few octahedra. They proved to be crystals of some earthy carbonate. The tumor was covered with mucous membrane, and columnar and spheroidal epithelium (see fig. 10).

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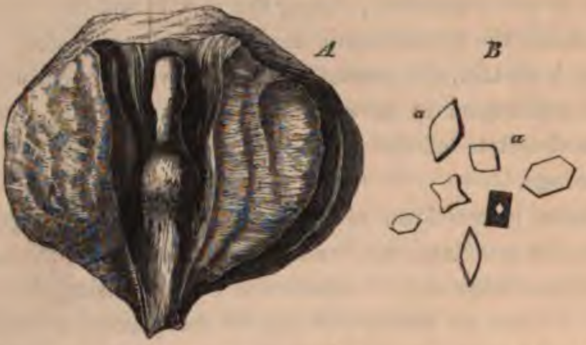
* Path. Anat., Syd. Soc., vol. ii. p. 235.

† Trans. Path. Soc., vol. vii. p. 250, with engraving.

FIG. 10.



The only point in the history of the patient which related to the presence of the polypus, was, that he had for some time been in the habit of passing water with greater frequency than usual.

ILLUSTRATIVE CASES.

Case I.—Enlargement of the Prostate due to Isolated Fibrous Tumors; Diseased and Sacculated Bladder.

J. P., aged 74, admitted to the Marylebone Infirmary October 27, 1855, under the care of Mr. Henry Thompson. Two or three years past he has suffered with the ordinary symptoms of chronic cystitis. Now, there is much irritability of bladder, no retention or incontinence. No. 10 catheter passes with perfect ease. The bladder slowly empties itself of pus and mucus after urine is drawn off. No calculus. Urine thick, opaque, mixed with much pus, slightly acid on several occasions, albumen considerable, no renal casts or crystals.

Only a slight degree of enlargement of the prostate is recognisable from the rectum. Patient suffers very little pain, but is extremely weak, and appears to be gradually sinking. Death occurred on the 7th of November.

Post-mortem, six hours after death.—Bladder and part of urethra removed entire The former is elongated, and projects upwards behind the pubic symphysis; the walls are thicker than natural. Projecting into the cavity, at its neck, is a lobulated tumor about the size of a small walnut, of yellowish colour and smooth aspect, contrasting strongly with the crimson hue and corrugated surface of the lining membrane of the bladder (Plate II., fig. 1). The cavity was contracted, and corresponded with about two-thirds only of the organ removed. The upper third proves to be a sac opening by a very small orifice into the bladder proper, and an opening made into it gave exit to about an ounce of pus and mucus. The tumor springs from the prostate, which, though not enlarged towards the rectum, bulges into the urethra considerably, and also into the vesical cavity.

Both kidneys are diseased, and contain several small collections of pus, besides some ordinary cysts.

On cutting into the left side of the prostate (marked "left" in the drawing) the section of a rounded body imbedded in the gland is seen. This body is four-tenths of an inch in diameter, is isolated from the surrounding tissues, separable from them in places with a blunt probe, but in others closely adherent, or united by prolongations of tissue common to both. It is lighter in colour, and apparently denser in structure than the adjacent parts.

Several other bodies of a similar character are found corresponding with the protuberances seen in the prostate before making sections of it. Three of the largest of them are dissected out (Plate II., fig. 2). The mucous membrane was first divided over them and turned aside; then a few longitudinally-disposed fibres, which in places peeled off from the rounded bodies like a capsule, but which at other points appeared to run into their substance, and to be continuous with it. One of these bodies, corresponding with a protuberance on the right side of the gland marked (*a*) in both drawings, is isolated in the preparation, and bands of fibres appear to unite it with the fibrous constituents of the gland behind. Small portions of tissue detached from any part of the bodies of which section has been made, exhibit under the microscope the elements of the organic muscular and connective tissues, closely packed in bands. Acetic acid developes a number of the rod-shaped nuclei lying longitudinally among the fibres.

An isolated mass of the true glandular elements of the prostate may be seen in one of the sections—that on the right side. It is obvious to the naked eye by exhibiting a yellower tint than the surrounding parts. Under the microscope it presents the ordinary glandular elements, as well as some of the minute "concretions" so called, often seen in the prostates of elderly people. None of these structures are found in the rounded bodies before described.

A large proportion of the bulk of the organ is made up of a whitish fibrous-looking tissue, which intervenes between masses of the gland structure, almost surrounding and isolating them. This tissue, under the microscope, is seen to consist chiefly of the connective filaments, intermixed with organic muscular fibre. The rounded bodies are made up of the same elements, and are more distinctly connected with this tissue than with the glandular parts, and may be, therefore, considered good examples of the ordinary fibrous tumors of the prostate. In this specimen some are imbedded in the mass of the organ; others protrude beyond its periphery into or towards the cavity of the bladder. They do not partake of the characters of the proper glandular structure, nor do they appear to have any close relations with it.

CASE II.

A gentlemen, aged 65, who had experienced some difficulty in micturition about twenty years. Marked symptoms, amounting sometimes to retention, had existed since 1851.

In the commencement of the present year (1857) he came under the care of my friend Mr. Sampson, of Ipswich, who suspected the existence of calculus in addition to organic obstruction of some kind. In May I had an opportunity of examining the patient in consultation with that gentleman, and we were satisfied of the existence of very considerable prostatic enlargement; but the condition of the bladder was at that time too irritable to admit of any sounding or operative proceedings for stone. There was more or less retention of urine requiring daily instrumental relief, and there was a depressed condition of the vital powers. It is unnecessary for the present purpose to enter upon the details of the case.

Death from exhaustion took place at the end of June. At the post-mortem examination the prostate was found enormously enlarged, the anterior or pubic portion being that which exhibited by far the greatest increase in size; this portion formed an irregularly-shaped nodular mass, about the size of a hen's egg, and contained numerous imbedded tumors, each about the size of a kidney bean. On examination I found these to be made up of fibrous material containing a considerable proportion of the glandular elements of the prostate. Nine small calculi were also found in the bladder, lying in a deep depression behind the enlarged prostate.

FURTHER ILLUSTRATIONS OF TUMORS OF THE PROSTATE, ETC., ABRIDGED FROM REPORTED CASES.

Mr. Paget, speaking of the detached outlying masses of new substance, like tumors in their shape and relations, which may be sometimes found in the vicinity of an enlarged prostate, says:—"A very large and remarkable specimen of the kind was sent me by Mr. Wyman. It was taken from a man sixty-four years old, who, for the last four years of his life, was unable to pass his urine without the help of a catheter. He died with bronchitis; and a tumor, measuring two and a half inches by one and a half, was found, as Mr. Wyman described it, 'lying loose in the bladder, only connected to it by a pedicle, moving on this like a hinge, and when pressed forward obstructing the orifice of the urethra.' Now, both in general aspect and in microscopic structure, this tumour is so like a portion of enlarged prostate gland, that I know no character by which to distinguish them."

This specimen is in the museum of St. Bartholomew's Hospital. —*Lectures on Surg. Path.*, vol. ii. p. 8.

On the 7th of May, 1849, Mr. Shaw exhibited a prostate gland, the left lobe of which was much enlarged. This condition appeared to be due to the existence of a tumor of the size of a hazel-nut in the centre of the lobe. It was "easily enucleated from the prostate, which body it resembled in structure; the only difference perceived by the microscope being that the gland was traversed by numerous small wavy fibres, which were not visible in the tumor." —*Path. Trans.*, vol. ii. pp. 83, 84.

On the 1st of April, 1851, Mr. Shaw exhibited a greatly-enlarged

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prostate gland, and says :—"Under the microscope the structure was seen to consist of fibrous tissue."—*Path. Trans.*, vol. iii. p. 127.

In January, 1852, Dr. Beith exhibited a greatly-enlarged prostate gland, and says that "Examined microscopically it was found to consist of the normal structure of the gland with some fibrous tissue in addition."—*Path. Trans.*, vol. iii. p. 389.

In November, 1855, Mr. Henry Gray exhibited an enlarged prostate in the centre of a projection of which was "a small tumor of a circular form, about the size of a hazel-nut, contained in a thick capsule of fibrous tissue, from which the tumor was easily turned out. It was very firm in texture, its structure consisting of cæcal pouches filled with epithelium, connected to each other, and surrounded by a fine filamentous tissue."—*Path. Trans.*, vol. vii. p. 252.

And in May, 1856, the Author exhibited a specimen, which is described as follows :—"On opening the bladder of a man aged 62, a nipple-shaped process was seen obstructing the internal orifice of the urethra. On dissecting out the prostate from its connections this substance appeared to be situated at so great a distance from the bulk of the organ as to suggest that it was an outlying tumor, and not a direct outgrowth from the gland. It was situated fully an inch from the interlobular notch of the organ; but on making section it proved to be connected with the posterior median portion and to contain a portion of true gland tissue, isolated by a capsule, which gland tissue contained numerous examples of the 'concretions' almost universally found in adult prostates."—*Path. Trans.*, vol. vii. p. 256.

At the Anatomical Society of Paris, M. Raoul Leroy recently exhibited a fine specimen, in which two pediculated tumors, one about the size of a nut projected from the lateral lobes of an enlarged prostate into the cavity of the bladder. A full account of the case is given, but it was evident from the remarks which followed that the existence of such tumors was called in question by the Society, or at least regarded as a matter of very rare occurrence. —*Bulletin de la Soc. Anat.*, Paris, 1856, pp. 414–420.

CHAPTER III.

THE CAUSES OF SENILE ENLARGEMENT OF THE PROSTATE.

The Subject of Causes Obscure.—Its Investigation extremely Important.—Most Circumstances alleged to be Causes must be rejected as such.—Present Views Stated.—By Quotation from Hunter—Wilson—Sir Chas. Bell—Sir A. Cooper—Sir B. Brodie—S. Cooper—Coulson—Gross—Desault—Amussat—Civiale—Mercier.—Inflammation not a Cause—nor Stricture and Calculus—nor Venous Stasis.—Gout, Rheumatism, and Syphilis not Causes.—Sexual Excess.—Prostatic Enlargement not Analogous to Glandular Hypertrophy, nor to Hypertrophy of other Muscular Organs depending on Increased Function.—Enlargement of Prostate and Uterus shown to be Identical in Nature.—Probably in Causation.—Probably a Necessity of their Common Structure.—Ascertainable Conditions under which Enlargement Occurs.—Analysis of Results arrived at in Relation to Age.

NEXT in importance to the discovery of some unquestionably successful means for the cure of enlarged prostate, perhaps, indeed, equal to it, would be a recognition of those circumstances which stand in the relation of causes, remote and proximate, to this remarkable affection. While some authors acknowledge that a considerable degree of obscurity attaches to the subject, others do not hesitate to express decided opinions in reference to it, confidently enumerating many things which they conceive to be undoubted causes; and all appear to agree in reference to some few of these, or, at all events, as to the existence of a strong probability in favour of so regarding them. It appears to me, however, that in order to accept the etiological views of this affection which are at present current, a good deal must be taken for granted; and that if we require a fair amount of evidence before we admit into the category of causes, the circumstances and conditions usually recognized, we shall probably reject them all, or very nearly so. However discouraging to the practitioner such a result may at first sight appear—however unsatisfactory such a confession of ignorance may be deemed by the student—we may rely upon it, that, if it be a true one, it is the necessary and important preliminary step to a better state of knowledge on this subject. The admission of a single circumstance into the list of causes which cannot be sustained there by something better than a fanciful belief, conventional custom, or by, it may be, the "impression" or the "conviction" of an author, unsupported by testimony, must assuredly become a stumbling-block in our progress towards truth. Better were it to sacrifice the apparent completeness which often seems to be thought essential to a pathological treatise, if it can only be obtained by collecting all the suggestions and speculations that have ever been associated with the subject in the literature of the past; and rather to exercise—however much the literary character of the work may appear to suffer—a vigilance, lest we admit too much, than an anxiety to press into our service every line resembling a contribution, under the semblance of information on the subject. Nothing would be easier, on such a principle, than to swell this chapter into a volume, and for the simple reason that so little is known of its subject, so much conjectured. But that the reader may possess a sketch of the opinions of some of the most experienced authors in reference to it up to the present time, I will state them as briefly as possible by way of quotation, and then attempt to enter upon an independent examination for ourselves.

John Hunter says nothing directly in relation to causes, but states that he has "seen hemlock of service in several cases. It was given upon a supposition of a scrofulous habit. On the same principle I have recommended sea-bathing," &c.* It should be remarked, however, that the distinction between the enlargement of the prostate in earlier years usually consequent upon inflammation, especially gonorrhœa, and the senile affection at present under consideration was not then made. In the chapter quoted, these two widely-differing conditions are spoken of indifferently; yet, on the authority of this passage, hemlock has been largely administered in the last-named complaint.

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* A Treatise on the Venereal Disease. 2nd edit. London, 1788. p. 174.

Sir E. Home, who enjoyed large opportunities for the observation of these cases, was of opinion that the chief predisposing cause consisted in "the slow return of the blood from the neck of the bladder, arising from the disadvantageous situation of the veins respecting the heart," inducing habitual congestion of those vessels; and that this was rendered more powerful by the undue indulgence in the pleasures of the table, or in any habits which "increased the circulation of the blood in those parts." The most common and influential proximate cause he considered to be the effects of horse-exercise, producing "rupture of vessels in the internal parts of glands," establishing thus "a great analogy between this complaint and apoplexy."* At the same time he believed prostatic enlargement to be one of the changes natural to old age.

Mr. Wilson, in his lectures at the College of Surgeons, in 1821, having stated that he has "met with several cases which confirm the justness of the observation" of Sir E. Home, respecting the liability of individuals of full habit to the disease, observes, "that it appears to occur most frequently in those persons, who, either from living a life of strict celibacy, have not used the genital organs so much as nature seems to have intended, or who have injured both the genital and the urinary organs by a life of excess." Finally, he adds that, "many persons have suffered much from the enlargement of the prostate gland, who have lived a moderate and quiet life, without approaching to either of the above-mentioned extremes." *

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* Practical Observations on the Treatment of the Diseases of the Prostate Gland, vol. ii. London, 1818. pp. 9, 10.

Sir Charles Bell gives no opinion as to the remote or predisposing causes, but believed that a predisposition to prostatic enlargement existing, one of the most frequent and important exciting conditions would be found in any source of irritation to the bladder, inducing repeated contractions of the organ. Whatever the occasion of these, which was indifferent as regards the ultimate result, the "muscles of the urethra" were set in constant action, the effect of which, according to his view, was to draw backwards the posterior median portion, to which he stated them to be attached, and thus to produce the elevation so frequently observed to form an obstruction to the emission of urine by the vesical neck.†

Sir A. Cooper says, "the enlarged prostate is the consequence of age, and not of disease." ‡

Sir Benjamin Brodie regards enlarged prostate as an almost invariable accompaniment of advanced age, assigning it a place in that category of phenomena which marks the decline of life. Thus he says, "when the hair becomes grey and scanty, when specks of earthy matter begin to be deposited in the tunics of the arteries, and when a white zone is formed at the margin of the cornea, at this same period the prostate gland usually—I might, perhaps, say invariably—becomes increased in size." Hence no other circumstances or conditions than the general one of declining life are mentioned by him in the light of causes. §

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* Lectures on the Structure and Physiology of the Male Urinary and Genital Organs. London, 1821. pp. 331, 332.

† Medico-Chirurgical Transactions, vol. iii., 1812 – pp. 171 to 189. Illustrated by three plates showing dissections of these muscles.

‡ Lectures in Lancet, vol. iii. 1824, p. 239.

§ Lectures on the Urinary Organs, 4th ed., pp. 163-166 and 186, 187.

Mr. Samuel Cooper, in his Dictionary, after reviewing various statements, sums up with the following opinion:—"It seems to me better to confess that the etiology of this complaint is unknown * * *;" but he adds, "I have known several persons afflicted who had led very sedentary lives." *

M. Coulson states, on the authority of others the usually recognized causes, but expresses no decided opinion in favor of any one of them. †

Dr. Gross, of Louisville, doubts the influence of some of the agencies usually assigned as causes of hypertrophy of the prostate, but thinks there is no doubt that it may be induced by the following:—"Habitual engorgement, protracted and frequently-repeated sexual intercourse, irritation resulting from the presence of a vesical calculus. Finally," he says, "the protracted or frequent use of stimulating diuretics, of wine and alcoholic drinks, exposure to cold, the repulsion of cutaneous diseases, gout and rheumatism, external violence, the frequent introduction of the catheter, and habitual straining at stool, as in chronic diarrhœa and other affections of the bowels, may all be enumerated as so many exciting or predisposing causes of this affection." ‡

Desault speaks of enlarged prostate as being "very common in elderly people, and in those who have had many attacks of gonorrhœa; nevertheless, it is not always a result of venereal taint." He believed that it might "sometimes arise in the scrofulous and other cachectic habits." §

Amussat adopts the older views which had long been current among continental surgeons, which his opinion may be regarded as well and briefly expressing. "Syphilis, the presence of a foreign body in the bladder, the existence of

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* 7th Edition, p. 1122.

† Diseases of the Bladder and Prostate Gland, 5th ed., p. 589.

‡ A Practical Treatise on the Diseases, &c., of the Urinary Bladder. By S. D. Gross, M.D. 2nd ed. Phil. 1855. pp. 688–691.

§ Ouvres Chirug., de P. J. Desault, t. iii. p. 238. Edit. 3^{e}. Paris, 1813.

strictures in the urethra, are its most ordinary causes. It is observed especially in elderly persons who have long used sounds or bougies, which they introduce themselves. In this case, the swelling of the prostate is occasioned by chronic inflammation produced by the contact of instruments." *

Civiale devotes a section to the special consideration of causes, in which he declines to consider speculative questions relating to the supposed analogy between the prostate and the uterus, or the resemblance which has been suggested to exist between its enlargement and that of the thyroid gland or liver, &c.; and enumerates those which he believes to be proximate or exciting causes; placing first in order of influence, the presence of calculus in the bladder. Next come organic strictures of the urethra and the difficult micturition which results. Much stress is laid upon this, and Cruvelhier's remark that stricture and prostatic enlargement rarely coincide, is quoted for the purpose of refuting it; Civiale stating that numerous facts exist attesting the accuracy of his view of the question. On the other hand, he admits that the influence is not constant, since urine, arrested by the stricture, may hinder, by means of the pressure reflected backwards, the prostate from becoming enlarged. The improper use of instruments in the urethra is placed next on the list. He combats the notion that venereal excesses have any intimate relation with the prostatic affection; and believes that authors have been far too ready to admit their influence without examining the question.†

Mercier, who discusses the subject at length, regards as predisposing circumstances, "all those which most favour stagnation of the blood. Persons of soft and lymphatic

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* Leçons sur les Retentions d'Urine. Par Dr. Amussat. Paris, 1832. pp. 199, 200.

† Traité pratique sur les Maladies des Organes Génito-Urinaires. Par le Dr. Civiale. 2^e^ partie. Paris, 1830. pp. 368-381.

habit, with the cellular and adipose systems largely developed, possess, generally, very lax and unresisting venous tissues; and observation shows that such are most frequently the subjects of prostatic engorgement." * * * * * "I believe there is a certain relation between weakness of the inferior veins and hypertrophy of the prostate; this explains why the affection appears sometimes to be hereditary." He considers sedentary habits to favour greatly prostatic enlargement, stating that shoemakers have formed one-third of his cases in hospital practice; after these come house-porters, weavers, and tailors. He adds that it is no less true that active men are also victims to it, and questions whether a vertical position of the body, much prolonged, may not produce the same effects as a sitting one. Finally, admitting the effect of blood stasis, he inquires, does this act "by rendering nutrition more active, just as a limb which is much exercised acquires great development, or does it rather retard the process of decomposition, rendering less easy the separation of elements which otherwise would be eliminated?" He confesses his inability to answer this question.†

In considering this subject for ourselves, it will be desirable first to examine the alleged causes of senile enlargement of the prostate, and show why many of them have no title to be so regarded. And first, inflammation must be eliminated from the category. Let us contrast distinctly the enlargement of youth or middle age with that of advancing years. Nothing can be more calculated to originate erroneous views than the habit common to most authors of disregarding this important distinction. Thus,

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† Recherches Anatomiques, Pathologiques, et Thérapeutiques, sur les Maladies des Organes Urinaires et Génitaux, considérées spécialement chez les hommes agés. Par L. Auguste Mercier. Paris, 1841. Chap. iv. pp. 218–233.

" the complaint " is said to be " very common among elderly persons, but occasionally met with also in early manhood." But no two affections can be more different than those which are thus confounded. One category cannot be made to contain them both. In youth the organ becomes enlarged by interstitial plastic effusion, the result of inflammatory action. In age, there is an unnatural development of the prostatic tissue itself. Histological examination of its elements, already sufficiently considered, shows that the redundant parts are in no way due to the inflammatory process, in any of its modifications. There is no proof that the enlargement which is constituted by undue production of the fibrous and muscular elements, whether in the diffused form or in that of tumor or outgrowth, is a product, direct or indirect, of inflammation in any part of the canal. The newly-formed tissues are not the result of morbid deposit dissimilar to the organization to which they are added, but of an immoderate development of the elements proper of the part. The action of inflammation, and the deposit of its products in a tissue, so far from favouring growth, is directly antagonistic to such a process. A prostate, therefore, which has been enlarged by inflammatory effusion, is, *cæteris paribus*, most probably less likely subsequently to exhibit a hypertrophic tendency. Nutrition is thus impeded, not encouraged. Inflammation must, therefore, be excluded from the list of causes.

Stricture of the urethra, and calculus of the bladder, are frequently stated to give rise, probably by irritation, to enlargement of the prostate. Respecting the first, the fact, as determined by numerous observations of the dead body, and careful examinations of the living, is, that a co-existence of stricture and senile enlargement of the prostate, is certainly rare. Obstruction to a catheter encountered beyond the stricture, and produced either by enlarged lacunæ, dilated urethra, or undue development of the muscular structures at the neck of the bladder, constituting more or less of a barrier there, is common enough, and has often been attributed to the complaint in question—but erroneously. Calculus of the bladder may, in a similar manner, induce the last-named state, which arises under circumstances of prolonged irritation whatever its cause (see chapter xii.), but not the hypertrophied prostate. Were the latter a result, we should surely sometimes meet with it in childhood and youth, periods of life at which stone is prevalent.

Habitual engorgement of hæmorrhoidal and prostatic veins is very confidently held by many as among the best-established causes of enlargement. In this manner, sedentary occupations are considered as predisposing causes. Anything which tends to obstruct the return of venous blood from the pelvis, such as mesenteric or hepatic obstruction, or the like, is ranged under this head. Great stress is laid by some writers upon the venous enlargement and stasis which elderly persons in particular are not uncommonly the subjects of. Undoubtedly, hæmorrhoidal swellings are thus produced, and most frequently. But is there any analogy between this effect and that observed in enlarged prostate? between congestion and thickening of tissues, by exudation from overcharged blood-vessels, and the new formation of normal structures? Do varicose veins lead to the latter result in any other part of the body? Assuredly not. The effect of venous stasis in the leg may often be seen in thickening of the integuments, and distension of the capillaries from which the veins arise, in the occasional occurrence of inflammatory action and consequent exudations or deposit into interstices of structure; but never in the increased production of pre-existing normal and healthy tissue. True hypertrophy, outgrowth or tumor; not one of them has venous congestion for a cause. Venous congestion impairs structure, diminishes its vitality, and, often enough, predisposes to ulceration the tissues affected by it, so that the slightest injury produces the destructive process, but it never augments the vital force, or stimulates growth. On these grounds, then, it must be dismissed from the list of causes of hypertrophy of the prostate.

Gout and rheumatism have been made to perform a part in the category of causes in this, as in that of almost every other obscure affection; but without the smallest foundation in observed facts. Elderly people often have rheumatism, and are subject to enlarged prostate. I confess, after a careful investigation of the subject, that I know of no closer relation between the two affections. Nor can I say more of gout. That either have any causal relation to the prostatic complaint I do not believe.

There is not the slightest foundation for regarding syphilis as a cause. Perhaps it is not possible to speak with the same degree of confidence in regard of sexual excess. Much influence has been attributed to the effect of habitual indulgence of this kind; but, from the fact that the affection has been observed to occur in individuals known to have been remarkable for chastity, the opposite extreme of continence has been regarded also as exercising a similar influence. In regard of the first, it appears reasonable to believe that repeated use may induce hypertrophy here as elsewhere; while, without entering upon the question of the prostatic function, it is impossible not to associate the organ with the sexual act; and, admitting these, it appears not to be easy to escape the inference that hypertrophy is likely to result from sexual excess. Yet facts do not favour this view; hypertrophy does not exist when the function is in greatest vigour, and is not called into immediate existence by the most licentious excesses indulged during the prime of life.

And it must be admitted that, when in any part of the body a hypertrophy is developed, it is coincident with, or, at all events, immediately follows, the increased action which induced it. Such is the universal law, and illustrations of its action must be familiar to all.

Supposing that we regard the prostate as a gland, its enlargement cannot be considered as affording a parallel, or even a very similar pathological result to that which occurs in hypertrophy of other glands. All its component tissues are not augmented in anything like nearly relative proportions. There is no analogy between its enlargement and that of a hypertrophied kidney, for example. Considerable augmentation in bulk may take place in the prostate, when the glandular elements appear not to be increased at all, and that in either case, whether defined tumor be present or not. But that the glandular element may also be largely increased is no less a matter of fact.

On the other hand, suppose that it be regarded as a muscular organ, which is permeated by a glandular apparatus, and its hypertrophy may be compared to that of the uterus or bladder, both of which, when in that condition, maintain the glandular tubes and follicles which belong to their lining membrane unaltered. A consideration of the structure and position of the prostate has suggested that its function is mainly a mechanical one, and, so far, analogous to the two organs just named. It has been regarded as an important portion of a muscular apparatus bearing pretty nearly the same relation to the seminal fluids, as regards the act of propulsion, as the bladder does to the urine.*

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* It is no part of the design of this work to enter upon the difficult subject of the function of the prostate. In my work on Stricture of the Urethra, which gained the Jacksonian prize of the Royal College of Surgeons for the year 1852, I stated my belief that its function was that of a muscle, and that it performed an important part in the apparatus designed to expel the semi-

But that the enlargement of the prostate is not a mere muscular hypertrophy, induced by increased action, and corresponding with the degree of augmented function excited, is proved by the facts just adduced, of its non-appearance during the terms of youth and prime manhood.

Nevertheless, viewing the phenomenon as involving a hypertrophy of the involuntary muscle, a condition the existence of which cannot be disputed, whatever be the opinion held as to the function of the organ, we may inquire whether the causes of such hypertrophy in other parts of the body, similarly constituted, have been ascertained, and if so whether anything may be gained by analogical reasoning, in elucidation of the subject before us.

There is but one other organ in the body which is similarly constituted, as regards the nature of the constituent tissue, and in the manner of its aggregation, a fact enlarged upon in the preceding chapter. The uterus, like the prostate, is composed of the inorganic muscular tissue distributed in thick strata, so as in either case to form a thick mass, not in thin planes, as found in all the other organs in which this tissue appears. The tendency to become the seat of local and general hypertrophy, of isolated tumors and outgrowths of a special character, which both organs equally manifest, has also been demonstrated. Starting from this remarkable fact, it is difficult to resist the inference that this tendency to overgrowth, this disposition to generate fresh elements identical in character with those proper to

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nal fluids—*vide* pp. 31 and 47—and further investigations have but confirmed that view.

Professor Ellis says, in a paper already referred to,—"It (the prostate) may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres, as, for instance, in the propulsion of the seminal fluid. Its chief office will probably be to hurry on the semen, and deliver this into the grasp of the voluntary muscular fibres of the constrictor urethræ."—*Med.-Chir. Trans.*, vol. xxxix. p. 332. 1856.

the structure of the organs, has a source common to both, and perhaps inherent as a kind of structural, or perhaps functional necessity. The capability of this structure for exhibiting rapid and enormous increase under certain circumstances, is admirably exemplified by what happens to the gravid uterus. A dormant force is awakened through the presence of the impregnated ovum, and the weight and bulk of the organ is in a few months increased tenfold. Active determination of blood is coincident, and doubtless supplying the materials of nutrition, but not venous congestion, nor any one of the numerous alleged causes of prostatic hypertrophy already referred to. But the uterine function having ceased temporarily or permanently, the organ diminishes and returns sooner or later nearly to its original size. During the latter moiety of the term of reproductive activity, the uterus is exceedingly prone to develope formations, identical in structure with its own, but more or less isolated from the parent tissues, either in the form of tumors or outgrowths, and these are associated with general development of the normal parts of the organ. These phenomena are observed, perhaps, with greater frequency in the virgin than in the impregnated female, showing that they do not depend upon any force called into play by pregnancy, but on one irrespective of it, and possibly inherent in the structure of the organ, or associated intimately with some function peculiar to it.

It is an interesting circumstance that the prostate, male homologue of the uterus, should exhibit analogies in many points of view with the latter organ in regard of its tendency to overgrowth. The most obvious explanation, and the conclusion which, after a careful examination of the subject, is that which appears to me better supported than any other, seems to be offered in the simple fact now completely established, that the structure in both is exceedingly prone to develope (as already shown page 42) among its component elements, minute, independent or isolated formations, possessing an organization identical with itself; which formations in the majority of cases do not increase beyond a certain very limited size, and do not interfere with the performance of any known function in either sex, but which in exceptional instances, continue to be developed, for the most part only, during a certain limited period of life, say, in general terms, between thirty-five and fifty in the female, and between fifty and seventy in the male; in the one case appearing in the form of uterine hypertrophy or tumor, in the other in that of prostatic hypertrophy or tumor. Whether the formation of these products is anything more than a contingency of structure, that is, whether it be connected with any functional action common to the structure in both cases, is more doubtful.

Anatomical examination of the enlarged organs, prostate and uterus, demonstrates the arteries and veins to be both enlarged, the latter, probably, as a result of the former. An increased supply of arterial blood is coincident with the increasing size of the organ; but whether the vascular determination precedes or closely follows the commencing development it would not be easy to affirm.

Are there any circumstances in the mode of life, or of pre-existing disease, which we are warranted by reasonable evidence in considering causes of prostatic hypertrophy? I know of none. The fact that almost all known causes of diseases in general have been alleged to be so of this one in particular—what is it in reality but a tacit expression of the same opinion? Every diathesis—gouty, rheumatic, tubercular, syphilitic, has been arraigned as the offending cause. Every form of local excitement possible to the pelvic viscera has been similarly held accountable. Thus it follows that the bearing of any single circumstance becomes neutralised in the concourse of numbers. Every proposition finds its refutation in the presence of some other one among the multitude.

The origin of hypertrophy being thus attributed to a necessity of structure, no doubt all circumstances which tend to induce active determination of blood to the locality may aid in its development. Thus we find emotional excitement of a sexual kind, and actual excesses, over-stimulating food, sedentary habits, horse exercise, and many other conditions having a like tendency, enumerated among the causes of this affection. But the *initial* step in the causation of hypertrophy is, I believe, independent of, and probably uninfluenced by, any of these circumstances, although they doubtless tend to increase already-existing disease. And thus it is that much may be done by judicious treatment, by well-directed management, to retard the progress of enlargement, that disposition being exceptional to the majority of cases, even where the seeds of overgrowth exist, as in the form of minute tumors or commencing outgrowth. All that tends to diminish the local supply of arterial blood to the organ may be held to favour the condition of *statu quo*, or slow increase. This, however, is not the place to enter further on the subject of treatment; the allusion made is sufficient to illustrate the question under consideration.

We have now to inquire what are the peculiar conditions, actually ascertainable by inquiry, under which hypertrophic enlargement of the prostate, or tendency thereto, is developed.

It never appears but in advanced years. But it is not therefore a natural or necessary concomitant of age. It is, on the other hand, a complaint which the very large majority of elderly men escape. Contrary to the generally-received opinion, its occurrence is not normal but exceptional. An analysis of various particulars given of the dissection of fifty prostates at pages 17 and 18, presents an opportunity, as far as the data allow us, of determining the proportion of cases in which, after the fiftieth year has been reached, the organ is found to be enlarged. The number is amply sufficient to establish the fact stated above, although a larger number (which I hope yet to obtain) is necessary to determine proportions with an indisputable accuracy. Those which are presented here may therefore be regarded as closely approximative although not absolute.

Forty-three specimens are from individuals of fifty years old and upwards. Of these forty-three, two were unusually small, probably atrophied, and are struck out of this series, leaving forty-one.

Of the forty-one, fourteen exhibit either enlargement or a tendency thereto, manifested by the presence of tumor, more or less developed.

Of the fourteen, nine exhibit it in a very slight degree, established only by anatomical examination. In the remaining five, enlargement was considerable, and gave rise to symptoms during life. Only one died from the affection.

The following are the rates per cent. to which these results are equivalent.

Actual enlargement, or the tendency thereto, exists in about thirty-two per cent. of men above fifty.

Enlargement to a notable extent, producing symptoms, exists in only about twelve per cent.

The following facts are worthy of notice.

The average age of the nine cases in which the enlargement was slight, was sixty-four years.

The average age of the five cases in which enlargement was notable, was sixty-nine years, none being younger than sixty-one.

The average age of the persons of fifty years and upwards, not affected by any enlargement, was sixty-four years.

Among the twenty-nine unaffected, were individuals of greater age than any among the affected portion ; for example, one at ninety, one at eighty-five, two at seventy-nine. Among the affected, but one reached seventy-nine, and the tendency in that case was slight.*

It may then be regarded as established by these facts, that enlargement of the prostate, so far from being a change invariably, or even usually, present in old age is an exceptional condition. And it may be further regarded as highly probable that a slight tendency thereto, almost, if not quite, unrecognisable during life, may occur in about one out of three individuals after fifty years, and that a marked enlargement may be met with in one out of eight, rarely, however, before sixty years of age.

It is germane to this subject to remark here, that, on the other hand, atrophy does not appear to be an effect of old age when hypertrophy is not present, as has been alleged. Of the series of fifty examined, three unnaturally small prostates were met with—one from a man of twenty-one years who died of phthisis, greatly emaciated. The ages in the other cases were sixty and seventy-three years respectively. The series exhibits, therefore, twenty-seven prostates from elderly men, that is, at ages from fifty to ninety years, wholly unaffected by either hypertrophy or atrophy.

The period of life between fifty-five and sixty-five is that during which the affection is most commonly developed. I have never been able to meet with an instance of its occurrence before fifty years of age. On the other hand, it appears rarely to commence after seventy. Where it exists, the disease has generally made considerable progress before seventy or seventy-five. Consequently it is met with but unfrequently in later years, and is very exceptional after eighty. It is not altogether unknown however, rare examples having been met with at a much more advanced age. Dr. Beith has placed on record a case in which prostatic enlargement, and sacculated bladder as its consequence, formed the only abnormal conditions observable in the body of a man who died at the age of 103.*

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* Tendency only; no actual enlargement; the weight being normal, or 4 dr. 36 gr. Nevertheless the organ was full of small fibrous tumors. See No. 46 of the Series.

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* Trans. Path. Soc. 1850–51. p. 124.

CHAPTER IV.

THE SYMPTOMS OF ENLARGED PROSTATE.

Onset of Symptoms sometimes very gradual.—Sometimes sudden.—Phenomena first noticed.—Those which subsequently occur in their order.—Incontinence or OVERFLOW.—Characters of Urine.—Nature of "Ropy Mucus."—Complication with Calculus.—Bladder often much distended before Existence of the Complaint is discovered.—Last Stage.

IN the earliest stage of chronic enlargement of the prostate there are no symptoms sufficiently marked to attract the attention of the patient. It is probable indeed that a very considerable period, varying in different cases from a few months to some years, is passed between the actual commencement of enlargement, and the occurrence of anything which is observed to be unusual in the act of micturition, or of any kind of derangement arising from the organic changes which are taking place. The length of time which elapses between the onset of disease and the manifestation of symptoms, depends mainly upon two conditions; first, upon the character of the enlargement itself; and secondly, upon the constitution of the patient. In respect of the first condition, we shall see hereafter, in what degree the nature of the enlargement influences not only the severity, but the kind of symptoms produced; and learn also how it is that even a considerable enlargement of one portion of the organ may produce little or no inconvenience for a long period, while a much slighter increase otherwise situated, may be the cause of great disturbance, both locally and generally. Secondly, there is in these cases, as in all others, that natural idiosyncracy of the individual patient, which in one instance enables him to withstand the inroads of disease, and to a great extent adapt his constitution to altered circumstances, and in the other disposes it to yield, without much attempt to rally, to the morbid influences to which it is subjected.

Taking into account the variations which are thus encountered in the observation of numerous cases, the symptoms exhibited may be described as taking generally the following form and order of appearance.

It occasionally happens, as will be hereafter shown, that the occurrence of complete retention after some obvious exciting cause, as exposure to cold, &c., is the first announcement of the existence of prostatic enlargement. When, however, this is not the case, one of the earliest signs generally observable is a manifest diminution in the force with which the urine is ejected. The urine also makes its appearance less quickly than natural after the effort to expel it has been made, and a certain hesitation or uncertainty is experienced, before a stream is fairly established. The size of this is not necessarily much smaller than it was in health, but it cannot be projected so far by the ordinary amount of effort, neither can its force be much augmented by additional effort, a circumstance, occurring as it does in numerous but by no means in all cases, which is unlike to that which is observed in stricture of the urethra, where, however feeble the stream, increased action of the bladder almost invariably tells to some extent upon it. Indeed there is no doubt that in some forms of prostatic enlargement, increased efforts to make water do but augment the difficulty in micturition. A powerful contraction on the part of the bladder appears in such cases to add to the obstruction at its neck, a result which it is not difficult to understand when we observe the form which examination of the parts sometimes reveals. The desire to pass water becomes more frequent than natural, not greatly so at first, and the relief afforded by the act of micturition is less complete; there is not the satisfaction following it which is ordinarily experienced in complying with the dictate of nature in a state of health. Frequently the want occurs again in a few minutes, especially after the first effort on rising in the morning, when the bladder has become distended during sleep. In course of time, however, the act must be more repeatedly performed, and the period of night is no longer exempt from the calls to pass water. Pains in the groins, testicles, and thighs are sometimes, but by no means commonly, complained of at an early period. A sense of weight, fulness, or indefinable uneasiness about the perineum, rectum, and hypogastrium is felt, which the patient soon, almost instinctively as it were, learns to refer to the neck of the bladder. He is often subjected to annoyance by an unpleasant odour in the urine, which is new to him, and describes it as being strong and disagreeable—a symptom which to the feelings of some men is particularly repulsive. As the expulsive efforts to pass water become of necessity more vigorous and frequent, irritation of the rectum is experienced in a greater or less degree; the contents of the bowel are more frequently passed from inability on the part of the patient to prevent the act of defæcation accompanying that of micturition; and tenesmus, protrusion of the mucous membrane or prolapsus, and hæmorrhoidal swellings, are apt to result. The associated action of the bowel is the more likely to take place, if the enlargement of the prostate is developed in a direction backwards into the bowel, rather than forwards into the bladder. In this manner, an ever-recurring sensation of the existence of some matter in the bowel requiring removal is occasioned, and unavailing efforts are made to obtain relief at stool. Much stress has been laid by some writers, following J. L.

Petit, who seems to have originated the idea,* on the appearance of flattened stools, as an indication of this form of enlargement, but as far as I have been able to judge without sufficient grounds. I do not doubt that in some cases the motions may be passed in the form described, but should rather believe this to be an effect not of the protruding prostate, but of some action of the sphincter ani, which exercises a much greater influence upon the form than the organ in question can do. Of this I am certain, that in patients who have continued long under my observation, whose prostates have been found to protrude backwards very considerably from rectal examination made by myself, this appearance has not been presented. Again, I have not less certainly observed it in others who have had neither stricture of the bowel nor enlarged prostate to occasion it. As the history advances, pains directly associated with the condition of the bladder begin to form a more serious part of the sufferer's complaints. The constant aching and gnawing sensation behind or about the pubes which almost invariably attends on distended bladder or severe chronic inflammation of that organ, becomes one of the most trying consequences of its impeded function. Soreness and smarting in the direction of the urethra are frequently felt; and an aching or shooting pain extending to the glans penis, in which it is most acutely perceived. At the same time it is not uncommon that some muco-purulent discharge appears by the urethra; this varies with circumstances, sometimes appearing after exposure to cold or damp; or with an attack of retention; or with exacerbation of all the symptoms, depending, perhaps on a constipated state of the bowels; and then subsiding rapidly aud altogether under appropriate treatment. At such times it occasionally happens, as I have myself observed, that the irritation involves the testicles, which become unusually tender, and slightly swollen; while the urine is expelled with greater difficulty, or requires to be drawn off for a few days by the catheter. Vascular excitement of the penis, producing frequent erections, is also at times a concomitant symptom. But as the complaint has thus been manifesting gradually but most unmistakably the signs of progress, it is certain that the relief to the bladder in the act of micturition has been slowly becoming less complete, although the efforts to obtain it have become most painfully frequent, and wearing to the constitution. While in some rare cases, exceptional to the general rule, the effect of the growing enlargement of the organ may be to open or loosen the neck of the bladder, and thus permit a real incontinence, a condition in which the viscus has been rendered unable to contain more than a small portion of the urine; the result in by far the larger portion is, that the neck, the urethro-vesical outlet, is abnormally closed, and requires a preternatural amount of contractile effort in order to drive the fluid through it. Hence the bladder is never emptied, its contents not being expelled below a certain level; the act taking place only when to the natural power of the organ is added the weight of a quantity of fluid adequate to distend it, conjoined with the extra pressure which is derived from the mechanical elasticity of its walls under these circumstances, and the action of the abdominal parietes, telling of course with greater vigour in proportion as the size of the body to be acted upon is increased. It is not difficult to see that these evils, if unrelieved by art, must inevitably increase; the capacity of the bladder yielding to the constantly-augmenting demand upon it. Hence at length the organ becomes habitually filled, and the surplus only flows off at each act of micturition, and that often not by a stream, but rather by a succession of drops. At night, when voluntary control is suspended by sleep, urine drains away, to the great discomfort of the patient. At length the same thing happens by day also, and the condition of the sufferer becomes painful in the extreme, his person and clothes exhaling a most offensive odour of the stale and diseased secretion, his participation in society of any kind being wholly impossible, while the keenly-felt consciousness of having become a source of annoyance to those about him is a most painful addition to his own personal sufferings. This condition is generally described as incontinence, a misapplication of the term, as we shall hereafter see, which has been productive of fatal errors in practice. A much better term is that employed by the French surgeons, namely, "regorgement" (overflow); and this I shall for the future employ, as aptly indicating a condition which, so far from being one in which the bladder *cannot retain*, is one in which it *retains too much*. For this reason, in my work on Stricture of the Urethra, published in 1853, I employed the phrase "retention with incontinence" to designate the condition described, from the inapplicability of the word referred to. But the shorter term of Overflow is certainly preferable, and I shall make no apology, therefore, for seeking to naturalise the term in this its English form.

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* Traité des Maladies Chirurg. Tome iii. p. 24. Paris, 1790. Ouvrage Posthume. Par J. L. Petit.

A sign which should be looked for in such cases is the existence of dulness on percussion above the pubes, and the degree, if present, to which it extends. Frequently in chronic retention the bladder may be felt, and its limits defined by the dull note elicited as high as the umbilicus, although more frequently to the extent of three or four fingers' breadth above the pubes.

As the complaint advances, it becomes a matter of difficulty to commence the act of micturition, much straining taking place before the obstruction at the neck of the bladder is overcome, and the urine begins to issue. The patient is sometimes compelled to take a position more favourable than that of standing erect, and he leans forward in order to make the urethro-vesical orifice of the bladder the most depending portion, this having been tilted up, and raised considerably above the level of the floor of the viscus, by the enlargement of the posterior median portion of the prostate. His legs also are extended in order to obtain a firmer base of support during the powerful efforts he is obliged to make, although often fruitlessly. Indeed so forcible are the exertions which patients undergo in these circumstances, that a hernial protrusion has not unfrequently been thus caused. Meantime the constitution exhibits the effects of the advancing local disease, of pain and broken rest. The patient loses flesh, becomes pale or sallow, his appetite fails, and already advanced in years he "ages" rapidly. There are frequent febrile disturbances, and the strength rapidly decreases. Very slight irregularities, or exposure to adverse circumstances, disregarded with impunity in health, produce extreme distress from the severity of the symptoms occasioned. Attacks of complete retention are impending on these occasions, and thus also are embarrassed the vital functions of the kidneys, which have by this time become impaired through the long-continued impediments to the discharge of their secretion. Hence uræmic poisoning, inducing coma and death, is one of the modes by which the fatal event sometimes takes place, more especially when the sufferer has been a victim of the disease unchecked in its course, and unrelieved by art.

The occurrence of hæmorrhage to a trifling extent is a frequent accompaniment of the complaint. It thus sometimes relieves congestion, and may be to a certain degree salutary: often it occurs after exposure to cold, sexual excitement, or other circumstances which tend to produce a vascular determination to the pelvic viscera. Sometimes it results from the imprudent use of the catheter; and it may happen to an alarming extent.

The characters presented by the urine are important, and should be carefully noted. They are such as mainly depend on decomposition of some of its constituents from abnormal retention, mixed with the products of chronic inflammation of the bladder. Accordingly the first deviation from health noted by the naked eye is that it is no longer transparent, but a little cloudy, often pale, of a greenish tint, with a few shreds or flocculi suspended in it. More or less of mucous deposit slowly falls and floats rather than settles at the lower part of the vessel containing the urine, when it is set by. A thin pellicle forms on the surface, more or less whitish and opaque, sometimes iridescent. In later stages the mucus increases in quantity, and appears as the glairy, tenacious, slimy, adhesive matter so well known to be associated with chronic inflammation of the bladder; not miscible with the urine, it adheres to the side of the vessel, and follows the urine as it is poured out from one to another, in a mass which it is difficult to separate. In advanced cases this mucus sometimes exhibits traces of calculous, generally phosphatic, matter, in the form of small amorphous masses of soft consistence and whitish colour. These may be drawn out into long linear forms, and give a streaked appearance to the deposit. When the mucus has subsided there is sometimes deposited upon it an opaque creamy-looking layer, which is unaltered pus, mixed with crystals of the triple phosphate in varying quantity.* In any stage of the complaint, before such matters are observed in the urine, or long after their appearance, the urine may be darkened in colour from admixture with blood. The tint is not red, or rarely so, except from recently-effused blood, and then depending, perhaps, upon the employment of instruments. It is much more commonly of a reddish brown, or dirty hue, which the colouring matter of the blood assumes after mixture with urine, especially that which has become somewhat decomposed.

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* The so-called mucus, which is frequently passed in very large quantities from the bladder, is, according to my experience, usually a compound of pus and mucus, in variable proportions. It has by some been considered as merely pus rendered viscid by the addition of alkali. After repeated careful observations, chemical and microscopical, I find that its composition may be very different in different cases. In some it appears, after the addition of very dilute acetic acid, sufficient only to neutralise the alkalinity of the fluid, to be

The chemical reaction of the secretion is at first neutral, then alkaline in various degrees of intensity. The odour is pungent, ammoniacal, often fœtid, sometimes extremely so. These characters depend, to some extent, upon the quantity passed, that is to say, upon the degree of dilution with water, in which the solid constituents proper to the excretion are passed. This often varies considerably in the same patient from day to day; the measure being sometimes below, but more generally much above, according to my experience, the natural or healthy standard.

Under the microscope may be observed tesselated and spheroidal epithelium, blood corpuscles, and pus corpuscles; globules of a granular appearance, resembling the latter, but three or four times as large, are also frequently seen; these exhibit a tripartite nucleus with acetic acid, and are commonly found in cystitis, from whatever cause. Besides these organic elements, there are usually many of the prismatic crystals of the triple phosphate of ammonia and magnesia in great variety of form and size, and the amorphous granular matter, free, or adhering in thin flakes, of phos-

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made up almost entirely of corpuscles, with multiple or irregular nuclei: in such cases, I presume it is altered pus, and little else. In other instances the proportion of the corpuscles is very small in quantity when compared with that of the amorphous or very faintly striated viscid liquid in which they are suspended, which appearance leads me to conclude that the secretion proper of the mucous membrane predominates in the mixture over the purulent formation.

phate of lime. Other crystalline forms may be present also, such as uric acid and oxalates, but the first-named constitute the typical forms which are present in the urine of these cases. Albumen is not present until introduced either by the admixture of blood or pus; or, in later stages, by invasion of the kidneys by disease, either of an inflammatory character, through extension; or as a result of the disorganizing processes occasioned by regurgitation of urine from the bladder, and the pressure and interference with its excretory forces so occasioned; or by organic changes acting through the agency of a vitiated circulating fluid and impaired constitution. Under these circumstances, the casts of the uriniferous tubes will most probably be detected at times by the microscopic observer, and albumen will be thrown down in larger quantities on application of the usual tests.

As a result of long-continued disorder in the urinary apparatus, and of the changes in the urine itself, which have been thus described, it is not surprising that the formation of calculus not uncommonly takes place. Its presence will be suspected if sudden impediment is frequently experienced to the stream of urine; if there is much pain about the neck of the bladder, at or following the act of passing it; if the pain at the end of the penis is unusually severe, and if the blood and pus are very frequently observed, or are disproportionate in quantity to the degree of urinary retention or obstruction manifested, and especially if fragments of calculous matter have from time to time been passed. But it is true that the existence of calculus is sometimes masked by the prostatic disease; in the first place because many of the symptoms are common to the two disorders; and secondly, because the conformation which the neck of the bladder assumes in the latter affection, tends to prevent the occurrence, in some measure, of the most distinctive symptoms of stone; inasmuch as the foreign body is less liable to be engaged in the vesical neck, but lies back deeply behind the enlarged prostate. Hence, neither the stopping of the stream of urine, nor the pain immediately following micturition, may be very obviously present under the circumstances referred to; and yet a calculus may exist in the organ, and be the source of irritation both to it and to the system at large, giving rise to the secretion of large quantities of pus and mucus, of which it, and not the enlarged prostate, may be in greater part the cause.

The same absence of symptoms is favoured by atony of the bladder, the coats of the viscus not contracting upon the calculus, and so not producing the exquisite pain occasioned by the grasp which follows the act of micturition, in the bladder not so affected.

But, although such is the ordinary course of unrelieved disease of the urinary organs, resulting from enlargement of the prostate, the earliest signs of this affection are not always to be observed, as has been already remarked, in the gradual order of progression here presented. On the contrary, it is by no means an unprecedented occurrence for an attack of complete retention to reveal its existence for the first time. It is not that the onset of the disease should necessarily have been rapid under these circumstances; but that the impeded urinating function, although, probably, of long duration, has not excited any very obvious symptoms. It is still commoner to discover that the impediment has long existed when its presence has been least suspected. A patient, for example, who passes a sufficient quantity of urine daily, without particular effort, and more frequently than natural, who is conscious, also, it may be, of some little escape involuntarily during sleep, or even in the day on making any effort which requires straining, or, in other words, a strong contraction of the abdominal muscles, is very apt to think that his water passes with unusual—indeed, perhaps, with too much freedom; and the last thing in the world he dreams of is the existence, in his own person, of any obstruction in the urinary outlet. The condition of such a patient, too, has sometimes been overlooked, even by his medical attendant, and no specific investigation of the bladder is made. The apparent freedom of micturition has masked the real malady, and the treatment is directed only to those symptoms which have been productive of most discomfort or anxiety to the patient; it may be, only to the general *malaise*, or some febrile condition not uncommonly resulting from the hidden cause. The march of events, however, must ultimately throw suspicion on the state of the bladder; a catheter is passed, and, greatly to the astonishment of the patient, and sometimes scarcely less so in the view of those who have long watched him closely, some thirty or forty ounces of urine, or even a very much larger quantity, may be drawn off, notwithstanding that the act of micturition has been just performed. Now, it is during the prevalence of such a state of things that unaccustomed exposure to cold and damp, or undue indulgence in alcoholic drink, or in sexual excitement, may suddenly produce congestion of the already enlarged prostate; and a condition of complete retention, thus induced, may be the means of discovering the existence of the affection for the first time. After this the habitual distension may be greatly lessened in degree by the daily use of the catheter, but it rarely or never happens that the bladder is able to regain the power of evacuating its contents completely, as it does after simple over-distension of its coats, resulting from unnatural retention, when there is no organic obstruction at the neck.

The last stage may sometimes be indicated more by the signs of a gradual decline of the powers of life, than by those of advancing obstruction; on the other hand, the final symptoms are sometimes those of rapid depression, consequent on sloughing of a portion of the organ, and repeated hæmorrhages, with or without the infliction of instrumental injury; or of gradual exhaustion, from constant discharge of pus and mucus from the bladder; or, lastly, of uræmic poisoning of the system, from the failure of the eliminating function of the kidney.

CHAPTER V.

THE EFFECTS OF ENLARGED PROSTATE IN RELATION TO THE FUNCTION OF MICTURITION.—RETENTION.—INCONTINENCE.—ENGORGEMENT AND OVERFLOW.

Retention of Urine, more or less considerable, the general result of enlarged Prostate.—Contrast between Retention and Incontinence.—Retention due to Obstruction, not to Paralysis.—True Paralysis of the Bladder extremely rare, except from Lesion of a Nervous Centre.—Overdistention and Atony of the Bladder.—Tabular view, showing various degrees of Obstruction and corresponding results.—Engorgement and Overflow.—Importance of last-named Symptom.—Commonly confounded with Incontinence.—When does real Incontinence exist?—The effects on the act of Micturition produced by the various organic changes in the Bladder, Ureters, &c., which occur as the result of enlarged Prostate.

MECHANICAL obstruction, which may be situated either at the neck of the bladder or in the urethra, is the chief cause of chronic retention of urine; that is, a state in which the patient being unable by his unaided efforts to empty the bladder, retains there a certain portion of urine, varying considerably in quantity, just as the amount of obstruction itself varies, unless the fluid be withdrawn by artificial means. By far the most common cause of this condition is enlarged prostate; and when the obstruction thus occasioned is considerable, no urine at all may be passed by voluntary effort. The bladder then becomes permanently distended, unless the catheter be employed; and the fluid gradually increasing in quantity at length opens out the orifice, and flows off spontaneously. To designate this phenomenon the term Incontinence was originally applied, and is still employed by many, although it has long been well known that the condition so described is in reality the very reverse of *incontinence,* since the bladder already contains too much, and the surplus only overflows, the viscus often retaining much more than its capacity in a state of health would admit of. The bladder is in fact *engorged*, and the urine *overflows*.

The phenomenon of involuntary micturition in elderly persons is very frequently accounted for, not on the ground of existing obstruction, but on that of paralysis affecting the bladder. It is supposed that either the neck or the body of the bladder may be separately paralyzed, the remaining portion retaining its normal supply of nervous influence, a pathological state the existence of which it would be very difficult if not impossible to prove, and which, if it be an actual occurrence, is certainly extremely rare. On this theory, however, it is said that when the neck is paralyzed and the body unaffected, the vesical outlet becomes patent and incapable of contracting, and that the urine flows off as fast as it escapes from the ureters, while the bladder itself remains empty. The term Incontinence has been employed to designate this condition also, although it presents a state which is the exact reverse to that already so described. But in this case, whether a nervous lesion be the cause of the phenomenon or not, the term is appropriate, because the bladder is unable to retain; the condition may, therefore, be very accurately described as one of incontinence of urine.

On the same theory, also, retention of urine is supposed frequently to be caused by the converse form of paralysis of the bladder, that is, when the neck retains its nervous supply, and the body losing it, becomes unable to expel its contents. Thus it will be seen that the term Incontinence comes to be frequently applied to precisely opposite states of the containing function of the bladder. Hence the misunderstanding, the difficulties, and even the errors in practice which sometimes occur, especially to the student, in connection with this subject.

Now, without discussing here at length the question already raised, as to whether these local deprivations of nervous influence do, or do not take place—in the one case affecting only the neck of the bladder, at other times the body alone—I have no hesitation in affirming that in a great majority of the cases in which habitual retention of urine, with overflow of a surplus portion, exists, the cause is palpable and physical, and not impalpable or dynamical; a fact which in each individual case may be ascertained by examination, in other words, there is *an organic obstruction in some part of the urethra*, situated either at its commencement in the neck of the bladder, when it is usually constituted by enlarged prostate; or in a portion of the canal anterior thereto, where it usually takes the form of permanent or organic stricture.

We are, I believe, indebted to Mercier of Paris for first calling attention forcibly to the important fact that organic obstruction, not local paralysis, or impaired nervous supply, is the great, and almost universal, cause of the various states which are described as retention and incontinence, when existing in elderly individuals who present no sign of impaired nervous power in other parts of the body. To his able discussion of the subject I would refer my readers for the arguments in favour of this view.[*] It is not entered upon here, because I have preferred regarding it as a question of fact, rather than as a theme for abstract reasoning. The obstruction is, or is not present; if the former, it may be verified. Experience alone has led me to reject the impalpable cause, and to appreciate the material one, and to an extent sufficient to warrant me in referring to the fact alone for corroboration of the assertion made above.

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[*] See Recherches Anat. Path. et Thérap. sur les Maladies des Organes Urinaires et Génitaux, considérées spécialement chez les hommes agés. Part II. chap. i. Par L. Aug. Mercier, Paris, 1841. Also, Recherches sur les Valvules du Col de la Vessie, Paris, 1848. By the same. Chapter iv. And more recently by the same author, a paper, "Sur l'Inertie, ou Atonie de la Vessie," &c. Gazette Médicale, 1854.—The local paralysis theory was defended by Civiale, in a reply to the above, in the Moniteur des Hopitaux, Feb. 8, 1855. Mercier's rejoinder appeared in the same journal, April 10 and 12. See, also, these two memoirs, with some additions, in his latest work, Recherches sur le Traitement des Maladies des Organes Urinaires, &c. Paris, 1856.

In nineteen cases out of twenty, excluding two other classes of cases which will be immediately named, the symptoms described are invariably associated with permanent obstruction of some kind, as may generally be verified during life, or, more perfectly, after death. The exceptional cases referred to are, first, those in which there is a cerebral or spinal lesion of some kind, which paralyzes more or less completely the nerve functions of motion, voluntary and involuntary, of sensation, or of sensation and motion combined, of the whole body below the situation of the injury. In such cases the body and neck of the bladder are alike affected, still the result is retention and overflow of surplus urine,—the very condition, it may be remarked in passing, which is affirmed on the local paralysis theory (as above shown) to be the result of paralysis of the body and non-paralysis of the neck.

The second exceptional case is that in which, under the influence of certain circumstances, a healthy individual voluntarily retains his urine for a considerable period, in spite of urgent desire to pass it. The not infrequent result is that the muscular expelling apparatus of the bladder is overstretched, loses its tone, and is more or less unequal, for a certain period of time, to perform contraction in a normal manner. More or less chronic retention results, and may continue unless relieved in the ordinary way. To this state also the term paralysis has been employed; but as there is no evidence whatever that the lesion consisted in any loss or impairment of the *nervous* force transmitted to the viscus, it is indicative of a better pathology, and conduces to a better apprehension of the case in hand, to call it simply as it is, Overdistention, or, if preferred, Atony of the bladder. It is perfectly gratuitous in such a case to imagine a lesion in any part of the nervous system to account for this phenomenon, and it is, therefore, undesirable to speak of it as a paralytic condition of the bladder.

The phenomena produced by obstruction at the neck of the bladder caused by enlarging prostate, in connection with the function of micturition, may be briefly recapitulated as follows, and connected step by step with the organic changes which arise in the progress of the affection.

OBSTRUCTION AT THE NECK OF THE BLADDER FROM ENLARGED PROSTATE, PRODUCES .		ORGANIC RESULTS.
a. Increased efforts to expel urine through obstructed orifice;	giving rise to	Corresponding Hypertrophy of the muscular parietes of the Bladder.
b. Inability to effect a complete contraction of the Bladder; and consequent *Retention* of a certain portion;	"	Dilatation of the Bladder corresponding with the increasing amount of residual urine, the result of augmenting obstruction at the neck.
c. Increased inability to effect contraction of the Bladder from the increasing dilatation and consequent overstraining of the muscular coats;	"	Complete Atony of the muscular parietes.

d. The Bladder becomes *engorged* with urine, the neck is dilated, and the surplus *overflows*, irrespective of the will of the patient;	giving rise to	Organic changes, with a destructive tendency, in the mucous membrane of the Bladder.

Thus we arrive at a true appreciation of terms, which require no explanation, or limitation of their signification, and which, therefore, when applied to the morbid states described, simply and clearly speak for themselves;—Retention, Engorgement, Overflow. The term Incontinence should not be employed to denote alike one condition in which the bladder is full to overflowing, and another in which it is organically incompetent to contain at all, but should be reserved to designate the latter state alone.

I say "organically" unable, because, when from any cause of inflammation, such as calculus, tumor, &c., there is frequently repeated expulsive effort on the part of the bladder, and, consequently, but little retentive power, the term Irritability of the bladder is generally employed, as indicating a condition of activity, and therefore one very distinct from incontinence, which is, on the other hand, universally understood to imply the result of a passive or quiescent condition, resulting from organic change or malformation, in which the urine dribbles off, being neither retained nor expelled.

Real Incontinence, then, is a rare occurrence in the adult male. That it is so is one of the most salutary and important lessons which the student can learn. It should be held as an axiom, the importance of which it is impossible to overrate, that AN INVOLUNTARY FLOW OF URINE INDICATES RETENTION, NOT INCONTINENCE. How often has the overflow of surplus urine from an engorged bladder concealed the real evil from an inexperienced practitioner, and induced the patient to believe that his "water was too abundant, or passed too freely," and wanted repressing rather than withdrawing. And what has been his astonishment, when, the true state of matters being recognized by his attendant, the introduction of a catheter has given exit to some pints, it may be, of the retained urine!

But does Incontinence, that is, organic inability on the part of the bladder to retain urine, ever occur as the result of enlarged prostate? It is said by Mercier to be sometimes present, and is mentioned here on his authority. I must, however, add that although I have long sought an example, it has never yet been my fortune to be successful in verifying the condition described. M. Mercier states that when the enlargement of the organ is uniform, so that each lateral lobe and the posterior median portion (middle lobe) are pretty equally augmented in size, the last-named part acts as a wedge, separates the two lateral lobes, and opens out the neck of the bladder, so as often to prevent the bladder from retaining the urine. He gives particulars of four cases under his own care, in each of which at an examination of the body after death the bladder was found empty, and contracted in size, while the prostate was enlarged considerably, but equally, so that the internal meatus was patent and of a triangular form. During the latter part of life, incontinence had been present in each case, and there had been no retention of urine.*

As has been observed in a preceding chapter devoted to the morbid anatomy of the affection, I have not seen a marked instance in the extensive collections which our museums afford, presenting a parallel to these cases of

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* Recherches Anat. Path. et Thér. sur les Maladies des Org. Urin. et Gen. Par L. Aug. Mercier. Paris, 1841, pp. 261-273.

M. Mercier, and must, in consequence, believe it to be a rare result. On the contrary, the bladder is almost always dilated considerably; or, at all events, is not less than the natural size. Never have I seen it much contracted; nor on examining the numerous recorded histories attached to these preparations, can I learn that real incontinence had been verified during life. It may be remarked further, also, that, generally speaking, the equal development of the three portions does not necessitate the opening out of the internal meatus, since the outgrowth from the posterior median portion is almost always directed backwards towards the cavity of the bladder, and presents no appearance of acting as a wedge *between* the lateral lobes, from which, indeed, on the contrary, it seems rather to diverge, as if forced out by their lateral pressure. The observation, however, is an interesting one, and future experiences may probably supply us with examples of the phenomenon in question; although, as before remarked, I believe they will be found rare and exceptional.

A result which almost uniformly occurs from considerable hypertrophy of the prostate, is elevation of the urethro-vesical orifice above the floor of the bladder. The entire neck of the organ is pushed up behind the pubes by the enlarging mass. The most dependant portion of the cavity is no longer on a level, or nearly so, in the standing position of the individual, with the outlet by which the urine has to pass; for the base of the bladder not being involved in the change, a depression, more or less deep, according to the degree of prostatic enlargement, exists behind the neck, in which urine may remain, after it has ceased to flow through a catheter lying just within the bladder. Hence the posture of the patient will sometimes affect the flow of urine, and, accordingly, he finds that when kneeling, or in the prone position of the body, he is able to pass water after ceasing to do so in the upright posture. In some few instances, the outgrowth from the posterior median portion having become pyriform, and possessing but a narrow pedicle, the mass is so movable as to fall forwards upon the vesico-urethral orifice in the manner of a valve, and close it very effectually when the individual is in the upright or in the prone positions. Thus a patient finds by experience that urine passes more freely when he is lying on his back, than by any other method. Such a circumstance may lead to the belief that this form of enlargement exists, a condition not difficult to verify, by means of a proper exploring sound (see the following chapter on Diagnosis).

Other circumstances may be briefly named as results of enlarged prostate, and affecting the function of micturition; viz. those arising from the hydraulic pressure exerted upon the entire urinary track, behind the point of obstruction. I shall merely name them here, as the whole subject is treated at length in my work on "Stricture of the Urethra," chapter the second. The changes thus produced in the containing and excreting organs are, in the main, almost the same, whether the obstruction to outflow is situated in the course of the urethra (stricture), or at the neck of the bladder (prostatic).

Hypertrophy and dilatation of the bladder are the commonest, indeed almost the invariable results of prostatic enlargement. Hypertrophy and contraction, on the other hand, are not uncommon in stricture of the urethra. Sacculation of the bladder often follows, being produced by protrusion of the mucous membrane outwards, through small interstices between the enlarged fasciculi of the muscular coat. The sac commencing as a mere indentation, becomes pouch-like, and, in the course of long-standing disease, is distended into a spheroidal cavity, capable sometimes of containing several ounces of urine. The presence of these sacs may be sometimes suspected during life, when, after the bladder has been completely emptied by a catheter, certain changes of position in the patient's body, in the course of a very few minutes, set free some three or four ounces of very turbid urine. Mr. Guthrie believed that the presence of a sac was proved by the occurrence of what he denominated "the fluttering blow of the bladder," communicated through the catheter to the hand of the surgeon. The phenomenon thus described by him I believe I have repeatedly experienced in circumstances in which there was no evidence of the existence of sacculi, and, indeed, every reason to conclude they were not present; I cannot, therefore, admit it as a diagnostic sign. The ureters may become dilated to a very considerable extent, and their walls at the same time be hypertrophied. The ureter has even been known to serve the purpose of a subsidiary bladder; in one well-known case it formed a tumor, easily recognized during life when distended, which reached from the pubes to the lower ribs, but which disappeared after catheterism. Dilatation of the pelvis of the kidney follows, and sometimes to such an extent that an organ so affected presents the appearance of a cyst, or congeries of cysts, a condition in which irreparable injury to the renal structure itself has been inflicted. Indeed, the kidney may ultimately almost disappear under the influence of such fluid pressure when long continued. Add to all these effects the noxious action of decomposed urine upon the whole extent of the mucous lining involved; the consequence of which is chronic inflammation, leading to ulcerative and gangrenous processes in various parts.

Such are the principal effects of prostatic obstruction, and the organic changes which take place in the organs behind its seat, as the results of large accumulations of urine, when not removed by artificial means.

CHAPTER VI.

THE DIAGNOSIS OF PROSTATIC AND OTHER OBSTRUCTIONS AT THE NECK OF THE BLADDER.

Examination by Rectum.—Method of conducting it.—Points to be verified. —Examination by Urethra.—Sound adapted for the purpose.—Ordinary methods of using it.—Rigorous Determination of Size and Form of Tumor often possible.—Diagnosis of Prostatic Enlargement from Stricture of the Urethra.—From Calculus of the Bladder.—From Tumor of the Bladder.— From uncomplicated Chronic Cystitis.—From Atony of the Bladder.— From Paralysis of the Bladder.

ALTHOUGH an observation of the ordinary symptoms of prostatic enlargement, when appearing in an elderly patient, affords good ground to the surgeon for entertaining a pretty correct surmise as to the nature of the complaint, still its existence cannot be asserted without a manipulative examination.

Just as in the case of suspected stone in the bladder, the sound must reveal the presence of the foreign body, so, in this case, must the sound and the finger recognize the existence of prostatic enlargement, irrespective of the evidence which may be derived from the existence of any symptoms whatever; and they should also define, as far as possible, what are its nature and extent.

The test which is chiefly depended on by the surgeon is an examination, by means of the finger, in the rectum. It is so familiarly known and commonly employed, that it might be deemed superfluous to enter into details respecting the method of its application. To the student, however, this will not be the case; neither will he, nor will any one unpractised in such explorations, learn much by employing it, unless he has attained some previous knowledge by experience, the accomplishment of which may, however, be greatly facilitated by some preliminary hints. Such is all I propose to offer here, in the belief that they will not be without their utility.

The patient should, as a rule, lie on his back upon a couch, the surgeon standing on the left-hand side, so that the fore finger of his own left hand may be employed in the rectum, while the right hand is free to use a catheter if required, since by concerted movements of that instrument in the urethra, and of the finger in the rectum, more accurate information may sometimes be obtained than by either exploration conducted separately. The nail of the left index finger should be cut very short, and it is a good plan to fill the creases around it with a little common soap, and then to oil the whole finger thoroughly, as, by this means, fæcal matter is prevented from lodging in them. The patient's knees being drawn up and separated a little from each other, the finger should be made to glide slowly through the sphincter, and when introduced as far as possible, so that two phalanges are free to move in the bowel, the limits of the prostate may be defined. It is necessary to bear in mind, not less for the patient's comfort than in order to gain the opportunity of making a satisfactory examination for the operator, that the finger should be carried thus far, and through all subsequent movements, with the greatest possible gentleness, and with no rapidity or haste. The healthy prostate may now be at once defined; but first, situated immediately within the ring of the sphincter, in the median line of the anterior wall of the bowel, which recedes suddenly at this point, may sometimes be felt the termination of the bulb of the urethra, and, at all events, the membranous portion. Going higher, the apex of the prostate is distinguished, and gradually widening out, the body, which presents a firm feel, and an outline distinctly suggesting that of a flattened chestnut; the finger will readily appreciate a slight depression marking the line of the urethra, between its two lateral lobes, and may glide over the outer borders of the latter, into a hollow on either side; returning to the median line, it may pass upwards until the firm prostate is no longer felt, but the more yielding tissues of the bladder behind its base, especially in the centre, at the interlobular notch, which is readily reached in the natural state of the parts.

Once familiar with the normal conditions thus presented, deviations will easily be recognized; but without such previous knowledge, it is useless to expect the attainment of much information by the rectal exploration in the search for that which is abnormal; and quite impossible to appreciate any but very considerable developments of disease. It is desirable to pursue a methodical plan in conducting these examinations. For example: the first step of the inquiry should have for its object the deviations in size and form. The first-named is almost always in the direction of enlargement. Is it general, or partial? affecting one, or both lobes? and to what extent? Affecting breadth mainly, or forming a rounded protrusion into the bowel? I have found it so prominent sometimes, that the tip of the finger encounters the swelling the moment it enters the rectum, and has to be depressed very considerably before it can be carried beneath the tumid organ. Again, instead of finding the yielding coats of the bladder in the middle line, when the finger is carried up to its fullest extent, an increasing fullness and firmness may be encountered, due to an enlargement or outgrowth from the posterior median portion ("middle lobe") occupying that situation, and defying all attempts to define it. Then the form of the enlargement may not be uniform or spheroidal; it may be irregular, knobbed, or mammilated. This, also, it is of importance to note.

Secondly, the consistence of the parts is to be ascertained. Is the tumor soft, hard, or unequally so in places? Is there fluid in it? And—often a question of vital importance—can we appreciate fluctuation distinctly beyond it? In the latter case, the right hand should be applied to the hypogastric region, and firm pressure made there, with the view of ascertaining if a large body of fluid, such as a distended bladder, can be pressed down upon the apex of the finger, in the rectum below; then gentle but sudden taps should be made on the same region, for the purpose of imparting the wave-like impulse which, under such circumstances, will be communicated. This proceeding constitutes an important mode of verifying the condition of the bladder, and the proper position for the trocar, when the operation of puncture by the rectum is about to be performed, or its applicability to the case in question has to be determined. At the same time, the situation of arterial branches is ascertained, one or two of considerable size may generally be felt lying a little to the right or left of the middle line, and sometimes crossing it, branches of the hæmorrhoidal arteries. The presence of prostatic calculi may generally be thus ascertained, being usually felt with ease, when rather large or numerous, lying in one or more cavities of the prostate, with very little tissue intervening between them and the walls of the rectum.*

Thirdly. We seek for the degree and locality of tenderness on pressure. It is desirable to make, in a distinct manner, first giving the patient notice of our intention, firm pressure with the point of the finger in three different spots;—on the centre of the prostate, on the extreme right and left borders, consecutively, permitting an interval of a few seconds to elapse, that he may clearly distinguish each separate movement, the sensation occasioned by which he is required to describe. If inflammation is present, the pain will be extreme, and the mere introduction of the finger will be very distressing to the patient; in this case, heat and tension will be remarked also.

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* I have a patient now under my care in the Marylebone Infirmary, in whose prostate a considerable number of calculi are imbedded. The grating from these is very perceptible to a finger in the rectum, when a catheter lies in the urethra, and is gently pressed downwards.

Lastly, supposing the catheter to have been previously introduced, we may, while holding it in the right hand, and communicating to it gentle movements downwards, gain an approximative idea as to the thickness of the tissue which intervenes between it and the finger in the bowel, and as to the situation and direction of the instrument, &c., in event of there being difficulty in introducing it. But its presence there is extremely useful if only for the purpose of furnishing a solid body of known size and form over which the exploring finger may pass; and by the aid of which it is obvious that most of the above-mentioned inquiries can be prosecuted with additional facility and certainty.

Having learned relative to these different points all that can be attained through the rectum, the urethra is to be explored. A full-sized catheter, of the form ordinarily employed by the surgeon, should be first used, because any phenomena presented differing from those observed when the prostate is healthy are then at once made apparent. If by examination through the bowel we have found no variation in regard of size, and have now ascertained that the urine flows when the catheter has traversed not more than the ordinary distance, say from 6½ to 8 inches, while the handle of the instrument itself has not required more than the ordinary amount of depression in order that its point may enter the bladder, we may be satisfied that prostatic enlargement does not exist, and we must seek for another cause of the symptoms complained of. But if the catheter has passed easily, say for nine or ten inches, which is at once known if the instrument is graduated (as all such ought to be) and still no urine flows; and if, in addition, while following its course, the handle has become more than usually depressed, approaching almost to the horizontal line (the patient being recumbent), there will be little doubt in respect of the existence of prostatic enlargement. The ordinary catheter being inadequate to reach the bladder, or doing so only when it has passed further than usual, and in the position described, another instrument may be employed. This is generally one which measures from two to four inches longer, and possesses a larger curve than the ordinary catheter; while some instruments describe also a larger arc, a third, for example, instead of a fourth, of the circle. If such pass readily, the increased length of the urethra is easily ascertained, and the direction of the prostatic canal is calculated from the position of the shaft noted at the moment that the point enters the bladder. A medium prostate catheter (see fig. 15, p. 169) has its beak at right angles to the shaft, the recollection of which makes the direction and even the exact position of the beak obvious at once to the mind's eye, the axis of the shaft being, as it always is, in view. When the curve of the instrument is prolonged beyond this, the degree of incurvation being known may be allowed for, and its position is then ascertained without difficulty. In some few cases, while the beak passes through the prostatic part of the urethra, the handle will be distinctly deflected to the right or left, from which fact, if verified by two or three trials, a greater degree of enlargement may be suspected to exist on the side *towards* which the handle turns.

In this manner, we may obtain approximatively correct views of the size and mode of development of the prostatic enlargement. The progress of the complaint may be noted from time to time, but I am not aware that any very considerable advantages can be obtained by the possession of more exact knowledge respecting the tumor, attainable, perhaps, at the expense of reiterated and more painful applications of the instrument than those at present alluded to; unless, indeed, there is any ground for advocating the adoption of some operative proceedings, such as the division of an obstructing bar or the like: a subject which is discussed at length in the twelfth chapter. In view of any such undertaking, it is necessary to make an accurate diagnosis of the nature and size of the tumor; and this it is, within certain limits, in our power to accomplish, if ordinary care and the proper method be employed. But although we may not entertain any such intention, it is not the less desirable to be able to familiarize ourselves with the manner of accurately determining the condition of the prostate, of the bladder and its contents, especially in relation to the question of calculus or tumor, and for such a purpose the instruments with a large curve, already described, are wholly useless. Hence it is necessary to resort to one of different form, and that now usually adopted in sounding the bladder, is well adapted for the purpose; viz. a sound with a very short curve at its extremity, or possessing a beak rather than a curve, which is much shorter and more angular than that of the ordinary catheter. Instruments somewhat resembling this description have long been employed, but their use for sounding the bladder, and more especially for examining the condition of the prostate, has, during the last thirty years, been more particularly advocated by those among the French surgeons, who have bestowed special attention on maladies of the urinary organs, as Civiale, Leroy D'Etiolles, and Aug. Mercier. The two latter have represented the forms which they employ; see the adjoining figures (figs. 11 and 12). It will be seen that they differ but little from the sound which is now generally used, and scarcely, if at all, from the form of the common lithotrite. The short beak is of course for the purpose of being carried into the bladder, in which cavity it can with care be turned freely in any direction, provided a sufficient quantity of urine or other fluid is retained. In this manner not only can every part of the bladder be searched for calculus, but information respecting the form and degree of obstruction at its neck can also be acquired. After the bladder has thus been traversed, the instrument should be gently withdrawn until the beak lies just within the urethro-vesical orifice, when by turning it round to the right and left, the natural condition, if it exist, of that part can be ascertained; or, on the other hand, the presence of tumor, or of stone, the

FIG. 11. FIG. 12.

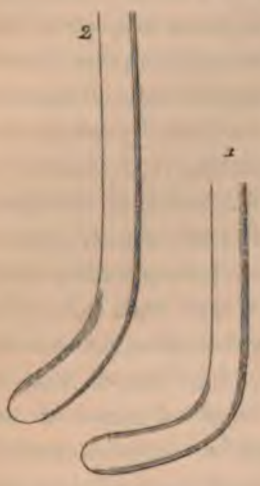
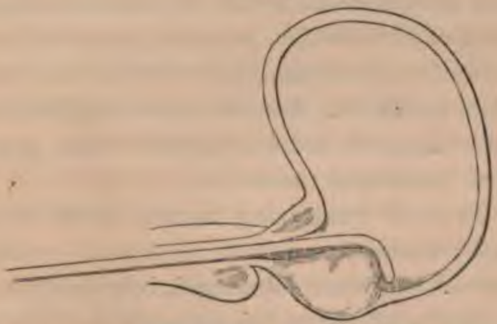


FIG. 13.



depth of the fossa behind the prostate (fig. 13), and other relative points, can be determined. Without giving my complete adhesion to a practice which requires the performance of the extremely numerous and varied manœuvres for the purpose of arriving at a diagnosis respecting the precise terms of a prostatic enlargement, which our French brethren habitually resort to, it may not be altogether unprofitable briefly to notice the methods by which the attainment of exact information respecting it is sought. I say sought, for I have good reason for believing that such manœuvres have sometimes failed of their object, even in the hands of the most expert disciples of the practice. And again, since I am compelled for the most part to express an objection to the practical end which these manœuvres have confessedly in view as employed in France, that is, the destruction by mechanical or chemical means of the obstructing portions of tissue, there is additional ground for doubting whether the employment of many of them can conduce to any beneficial result. Nevertheless, as some very useful hints may be derived from an observation of the manipulations referred to, I shall describe only one or two of the simpler means in use, for diagnosticating tumors of the neck of the bladder, premising that the instrument employed is always one similar to either of the two delineated at figs. 11 and 12. For the more complicated proceedings of this kind, the reader is referred to the practice and writings of the authors themselves.

1st. Means of recognizing tumors which rise into the neck of the bladder.

The sound having been introduced, it is slowly and gently, but completely, rotated on its axis in the cavity of the bladder, and close to its neck. If the prostate is healthy, this is done without any elevation of the instrument, and the shaft retains an almost horizontal position (the patient of course being recumbent). But supposing that there is a tumor at the neck of the bladder, the beak will be arrested in the movement of rotation, and it will be necessary to elevate it proportionately to the height of the eminence, after which it will descend again, the movement of the handle indicating approximatively the size and form of it. If, in introducing the instrument through the prostatic part, the beak is found to rise gradually, the handle being depressed below the horizontal line, there is probably spheroidal enlargement of the middle portion. If, on the contrary, the beak abuts upon an obstacle there, and has to be lifted over it in a direction upwards, entering the bladder with somewhat of a jerk, there is probably an enlargement of the same portion, but affecting the form of a bar, with a deep sinus of the prostatic part of the urethra. In withdrawing the instrument from the bladder, the beak being turned downwards to the basfond, if the prostate is healthy, it will come back into the urethra easily, but if there is an enlargement there, it will hook against it, and not leave the bladder in that position.

2nd. In order to recognize an enlargement of the prostate projecting into the urethra, Mercier proceeds as follows: "After having explored the bladder, I draw the instrument gently back into the prostatic region of the urethra, pressing lightly upon it, at the root of the penis" (its upper aspect), just under the pubic symphisis, so as to press the angle of the sound or salient part of its curve against the posterior wall of the prostatic urethra; then I draw it forward without elevating its shaft towards the abdomen as in ordinary catheterism, and without making it deviate much from the axis of the patient's body (15° to 25°). When there is a simple enlargement of the prostate in the antero-posterior diameter, the beak traverses it easily, without inclining either to the right or left. If, on the contrary, there is a projection of one of the lateral lobes, the beak, in passing the spot, inclines to the opposite side: the handle indicates this movement and the direction in which it is made."*

This portion of the subject may be appropriately closed with a few remarks on the diagnosis of prostatic enlargement from stricture of the urethra, vesical calculus, tumor of the bladder, simple atony or inertia of the coats of the bladder, and paralysis.

In stricture of the urethra, the stream of urine is invariably small, in a confirmed case extremely so; in the prostatic affection, though diminished in force, it is much less so in volume than in the previous case. The use of a full-sized sound, however, marks the distinction clearly. In stricture, obstruction is encountered almost invariably before six inches of the instrument have disappeared, always before it arrives at the prostatic urethra. In enlarged prostate, obstruction is not encountered until eight or nine inches have passed, and not necessarily then, for, provided that the instrument be sufficiently long, it may pass into the bladder; but the handle has to be depressed between the patient's legs in a manner not required in the normal state. Lastly, stricture almost invariably makes its appearance before middle life, prostatic hypertrophy not until that period is passed.

In regard of calculus, while many of the symptoms are common to both complaints, the occurrence of sudden cessation of the stream of urine, of severe pain at the close of micturition, the exacerbation of symptoms, especially of pain, and the appearance of a little blood after exercise, may be looked upon as strongly indicating the presence of stone in the bladder. But it may exist in the absence of most of these, the two first-named especially, from the circumstance that the calculus is usually situated behind the enlarged prostate, and does not approach the more sensitive region of the internal meatus. The fact of small quantities of florid and unmixed blood being occasionally passed after exercise, more closely approaches in value to a pathognomonic sign than any other. A persistent discharge of mucus, or ropy pus, in the urine should also arouse suspicion. The use of the sound, however, can alone clear up this case also satisfactorily.

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* Recherches Anat. &c., pp. 364, 365.

The existence of tumor of the bladder is less easily affirmed. Compared with prostatic enlargement there is much more pain, and exquisite tenderness on the introduction of instruments, the urine is frequently or generally mingled with sanious discharge and flocculi, to which sabulous matter is often seen adhering. Examination of these under the microscope may reveal the peculiar structure of villous growth, or which is almost equally significant, may demonstrate that they consist of organized structures, not of inorganic materials.

Simple uncomplicated chronic cystitis, with catarrh, is by no means a common affection. The series of symptoms thus denoted is almost invariably due to the presence of a foreign body, to some form of obstruction, or to paralysis, depriving the patient of the power of expelling the contents of his bladder, a condition which is tantamount to obstruction. We may rely upon it that in most of the obscurer cases, there is a material cause, most frequently calculus; the presence of which needs a more than ordinarily-searching examination to verify. It may be encysted, or otherwise rendered difficult of detection by the sound. The absence of all the physical signs of enlarged prostate, by rectal and vesical exploration, will, of course, prove the non-existence of that complaint as a cause.

Single or repeated acts of voluntary over-retention of urine are sometimes followed by atony or inertia of the muscular parietes of the bladder, and a state of chronic retention follows from their consequent inability to expel the vesical contents. The condition resulting resembles much the retention produced by enlarged prostate, and requires frequent relief by the catheter in the same way, at least for a time. Here the absence of positive signs, the suddenness of the attack, its connection with a cause generally recognized by the patient, and the diminished power of discharging the urine *after a catheter has been placed in the bladder*, are quite sufficient to distinguish this affection. Particular attention should be paid to this last-named point. In enlarged prostate, the urine often flows with considerable force when the influence of the obstruction is removed by the introduction of a catheter, and the current can be accelerated materially by the will of the patient, unless there be atony also, as there may be from undue distension; however, it is not generally considerable, except in long-neglected cases. But when the cause of engorgement and retention is not obstruction, but complete atony of the bladder, the urine runs out of the catheter, and is not propelled, neither can the flow be much influenced by any efforts of the patient.

Lastly, there is paralysis of the bladder, a condition in which its nervous supply is either impaired or destroyed. It is almost always associated with a similar condition of the lower extremities, and this may result either from disease or injury of the encephalon or spinal cord. There is no evidence of the existence of true paralysis, that is, a removal or impairment of nervous influence, *limited to the bladder;* nevertheless, the term paralysis is constantly applied, but most inappropriately, to denote inability of the viscus to expel its contents, whether the cause be obstruction at the neck, or over-stretching (atony) of its muscular walls. The bladder is not deprived of nervous force, and thus rendered paralytic, except when there is lesion of some nervous centre involving numerous other parts in the same predicament, any more than is the stomach, the intestines, or any other single viscus (see preceding chapter). There can be no doubt respecting its presence; therefore, when it does exist, the indication which catheterism presents is also singularly characteristic. An instrument being introduced, the urine is propelled by the weight of the parts around, the will of the patient exerting no influence upon its flow unless the abdominal muscles should be in a normal condition, as in cases of injury (rare) occurring to the spinal cord between the sources of nervous supply to the muscles and to the bladder, in which case a slight influence is perceptible. Otherwise no impulse is noticeable, except through the agency of acts unassociated with micturition; such as deep inspiration, coughing, sneezing, and the like, by which a momentary pressure is communicated to the paralyzed bladder, and the stream is momentarily accelerated.

CHAPTER VII.

THE TREATMENT OF SENILE ENLARGEMENT OF THE PROSTATE.

The subject one of considerable importance.—May be treated under Three Heads.—1. Treatment for the purpose of obviating the results of obstruction caused by enlarged Prostate. Necessity for removing retained Urine—Question of patient relieving himself—Instruments to be used—Of permitting a Catheter to remain in the Bladder—Evil results of not relieving the Bladder. Treatment of Chronic Cystitis—Injections—Counter-Irritation—Baths—Buchu—Pareira brava—Uva ursi—Matico—Lythrum Salicaria—Alchimella Arvensis—Epigœa repens—Chimaphila—Wild Carrot—Copaiba—Cubebs—Benzoin—The Demulcents. Indications for use of the foregoing. The Mineral Acids—Alkalies—Benzoic Acid.—A Case.—Irritability of Bladder—Value of Opiates—Injections.—Hæmorrhage—Its Treatment.—Incontinence of Urine—Treatment.—Recurring attacks of Congestion.—2. The General Treatment and Management of patients with Enlarged Prostate—Dietetic, Regiminal, and Moral.—3. Special Treatment against Enlargement itself—Hemlock—Mercury—Hydro-Chlorate of Ammonia—Iodine—Mr. Stafford's Method—Bromine—Kreuznach Waters.—Compression, History of New Method of Applying.—Division and Excision—Crushing, &c.

The topic presented for consideration in this chapter is one of great interest and importance; and is well worthy to be the subject of prolonged and careful study. Its interest for the practical surgeon consists in the fact that, notwithstanding the generally-admitted intractability of the complaint, much may be done to palliate its most distressing symptoms, and to retard its progress; while, associated with this, is the knowledge that the attainment of any means capable of arresting that progress, or of curing the disease, would be one of the greatest boons ever bestowed by the science of medicine upon suffering humanity. The importance, therefore, of the subject is equally manifest. No wonder, then, that the search for remedial treatment should constitute one of the most alluring subjects of inquiry which can occupy the enthusiastic student of the healing art. Although by no means satisfied with our present achievements in this direction, there is no reason to esteem lightly the power which past experience and skill have enabled us to exert in prolonging the life, and ensuring the comfort of the patient. And I by no means agree with those writers who regard the enlarged prostate as one of the opprobria of medicine, and who urge with little confidence and slender hope, the employment of treatment against it. I do not doubt that the day will come when the complete control of this evil will be in our power, adding another to the already numerous and splendid triumphs of scientific medicine. Meantime every addition to our appliances which accomplishes a desideratum, however small, not before attained, and every advance in the knowledge of the constitution of the organ itself, both in its healthy and diseased states, may be regarded as progressive steps by which the consummation of that expectation will be developed.

In considering this subject, it will be found convenient to make three distinct divisions of it, and to regard them separately, as follows:—

1. Treatment for the purpose of obviating the results of obstruction caused by enlarged prostate.
2. The general, or constitutional, treatment and management of patients with enlarged prostate.
3. Treatment directed against the enlargement itself.

First,—the subject of treatment as far as it relates to the means of obviating the results of urinary obstruction caused by an enlarged prostate.

The relief of obstruction is generally the chief indication presented by a patient so affected, when first applying to his surgeon for advice. Unaware of the nature of his complaint, he seeks to be relieved from some discomfort produced by an obstacle to the free course of urine, such as undue exertion necessary to perform micturition, the unnatural frequency with which the want is experienced; some degree of involuntary micturition, or, perhaps, an alteration of some kind in the characters of the urine passed.

A diagnosis having been made by employment of the catheter and rectal exploration, the methods of arriving at which are fully considered in the preceding chapter, and the fact being discovered, as it usually is, that a certain quantity of urine is habitually retained in the bladder, however frequently or forcibly the efforts to evacuate it have been made, the first great principle to be followed out is this;—that it is necessary to ensure the complete removal of the urine from the viscus at least once a day. It may be very desirable to do this twice, or even three or more times daily, the necessity depending, in great measure, upon the degree of obstruction, and the consequent amount of residual urine. In general terms, if only two or three ounces are left after the act of micturition is performed, once a day may be sufficient; if it amounts to double this, twice will probably be better. If a much larger quantity of urine is retained than that passed by the natural powers, it is not unlikely that the instrument will be required three times in the twenty-four hours. And if the power of urinating is almost or quite lost, it will be necessary to employ it as often as a decided want to micturate is experienced. There are certain modifying circumstances which must be taken into account. Such are the facilities which exist for passing instruments, and the condition of the urethra itself. If the patient possesses the ability to pass a catheter easily for himself, and it is very rare indeed that he cannot attain it by tuition and practice, he complies with the demands of his case. But when the ability has not been attained, the difficulty may, in some circumstances, be serious, as when the operation is required to be performed every few hours, and the surgeon is unable always to afford the regular attendance which is desirable. It is, however, extremely imprudent to entrust this duty to any non-professional attendant; and the patient should be made to understand that, having his own sensations to guide him, he may soon attain considerable dexterity in the management of an instrument, at all events in the one passage with which he will become familiar. But, again, if the urethra is in an extremely irritable state, and this appears to be aggravated, as it must almost certainly be by the very frequent use of the catheter, however carefully it may be introduced, it will be necessary to consider carefully the requirements both of the urethra and the bladder, and some compromise must be made between the conflicting interests of the two. In the majority of cases met with, the removal of the urine night and morning suffices to maintain the reservoir in a tolerably sound and healthy condition, and it is extremely undesirable to resort to artificial aid with greater frequency than is absolutely necessary to accomplish this.

With regard to educating a patient to the use of the catheter, it should be done systematically on the part of his attendant, as soon as the former has become somewhat familiarized to it by observation. The patient should be taught to note accurately how much of the catheter remains projecting from the urethra and its line of direction with regard to the body, at the exact moment when the urine flows, so as to accustom his eye to judge correctly as to the point at which he may expect the appearance of a stream when the instrument is in his own hands, a moment always of some anxiety to the inexperienced performer. In using the catheter for himself, he should always stand, generally with his back against a wall, the receiving vessel being placed conveniently, so that no unnecessary movement of the body be made during any part of the time at which the instrument is within the urethra. As to the kind of instrument, I have seen silver and flexible instruments used with equal facility by different patients, the nature of the case, and the result of trials with both, deciding the question in each particular instance. Perhaps flexible instruments are, in the majority of cases, the better and safer kind. But where the senses are good, and sensibility acute, that instrument which the surgeon has found the best (and this will frequently be the silver one) will be most successful also in the patient's hand. The directions given will be precisely those which apply to the passing of instruments by the surgeon, detailed at length in the succeeding chapter, modified only by the fact of the operator having himself for the subject of his skill. This very fact ought to inspire him with confidence, for he possesses a most important advantage over his attendant in one respect, which will compensate largely at first, and altogether ultimately, for his want of varied experience on others which the surgeon possesses. It consists in his being able to regulate the movements of his instrument, not only by the sense of touch in common with any other operator, but by his consciousness of the sensations produced in the urethra, as it passes, which the surgeon cannot possess. On this ground it is undoubtedly true that, after long practice, few men can pass a catheter for the patient so well as himself, provided that his senses are acute, and that he possesses ordinary intelligence. Accustomed also to follow but one track, he knows intimately every portion, and learns some little manœuvre adapted to meet every difficulty which is presented.

When elastic instruments are employed, the curve is always required to be greater than they naturally possess as supplied fresh from the maker's hands. Hence the patient should be furnished with a good stock, and these may be kept with advantage for months, each mounted upon a well-curved stilet, so that when required it may retain as much of the curve as may be desired after the stilet is withdrawn (fig. 15, *g*). It should then be oiled, but not warmed, and used without delay, as the curve is soon diminished after removal. Nothing need be added here respecting modes of manipulation, which the patient learns from his surgeon, who will adapt his instruction to the necessities of each particular case. There is one little manœuvre, of trivial moment it may be thought, which was practised by a gentleman long a patient of my own, with enlarged prostate, and by whom it was adopted in order to obviate a degree of uncertainty produced in passing the gum catheter, by the yielding or bending of its shaft; and it certainly conduced materially to his success. He introduced into the instrument an iron stilet six inches long, which gave firmness to the stem or shaft, while the whole of the curved portion remained as flexible as ever. This ensured an amount of certainty in the manipulation of the instrument, which, as it was in his case assuredly not without utility, appears to me to be worthy of mention.

It has been considered by some that an advantage is obtained by permitting a catheter to remain in the bladder for days together. This appears to me erroneous. There are two hypotheses on which the advice is grounded. The first is, that by permitting the bladder to remain empty, or nearly so, we encourage it to regain its contractility, assumed to be lost or impaired by overstretching. This, however, is not the true pathological condition which causes retention in these cases. There may be some little loss in the muscular power of the vesical coats, but it rarely amounts to much. The material obstruction at the neck caused by the enlarged prostate, and not any "local paralysis," as it is commonly termed, is the sole, or almost sole, occasion of the urinary difficulty. This has before been explained and illustrated. Hence, from this hypothesis, the practice referred to gains no support. The second is, that the constant pressure of the catheter promotes absorption of the substance of the tumor, and so tends to the material improvement of the patient's condition. But the fact is that the tendency is much more to ulceration, than absorption, after the manner intended. Granting for argument's sake, however, that the desired action can be thus ensured, it has still to be proved that the object is gained, at an expense of pain and confinement, to say nothing of risk, sufficiently small to render the result an undoubted and valuable acquisition. Experience negatives the supposition. And should it turn out hereafter that we possess more powerful means of acting on the tumor by another kind of pressure, then there will be still less reason remaining in support of the practice. It will, of course, be understood that there is no reference here to cases in which urgent urinary retention has existed, which has been relieved with difficulty by the catheter. In such circumstances, as we shall see when discussing that subject in the following chapter, we may be justified in permitting the catheter to remain in the canal for a considerable period. But this need not be anticipated here.

The consequences of enlarged prostate already alluded to, viz. the increasing retention of urine and habitual distention of the bladder, which accrue from not completely emptying it daily, form only a portion, although a very important one, of the evils which can be obviated by this treatment. Associated with these, and entailed by the same cause, is that state of engorgement and overflow of urine, commonly termed, but inaptly, incontinence, which will assuredly follow gradually-increasing retention, if unrelieved, a state which necessarily exerts most injurious influence upon the ureters and kidneys, ultimately leading to their disorganization and thus to a fatal termination. Short of these results are the scarcely minor ones of chronic cystitis, catarrh, decomposed urine, and calculous deposit, and always accompanying them, impaired general health. All these can, under ordinary conditions, be avoided, and in most kept in abeyance by the persevering use of the catheter. It is impossible to overrate the benefits arising to the patient from this means; and the responsibility which is incurred by overlooking or failing to impress his mind with the necessity which generally exists for its use, should be ever present to the surgeon's mind in dealing with any signs of irritability of bladder, and incompetence to retain perfectly the urine by patients in advanced years.

Supposing, however, that our attendance is required for a case in which, from neglect or otherwise, many of the worst symptoms have set in, we shall require other and numerous resources to meet the difficulties then presented. Supposing that the due removal of urine from the bladder is first provided for, we may consider other means in relation to the various emergencies which are likely to arise, and for this purpose discuss each separately.

1. Chronic Cystitis; a consequence of enlarged prostate, which is always more or less present in advanced cases. If the symptoms are not severe, and the discharge of viscid mucus which accompanies it is not mixed with blood, much benefit may be obtained by simply washing out the bladder once a day with warm water, either with or without a double current catheter; the temperature should be about 100° Fahrenheit. After the mucus and purulent matter have been removed, which may be assumed to be the case when the water flows clear and untinged from the cavity, decided benefit is in some cases obtained from throwing in a very weak solution of nitrate of silver, in the proportion of

two grains to six or eight ounces of distilled water. The quantity of the salt to be increased, if the indication is manifested, up to one grain to the ounce, or stronger, although this is seldom desirable.

Depletion of any kind is, I believe, never admissible. Counter-irritation is difficult to employ, and often occasions much discomfort. I have at some times believed that benefit has been derived from the application of irritating plaisters over the pubes, and have occasionally used for this purpose a burgundy-pitch plaister, upon which 15 or 20 grains of tartar-emetic have been equably sprinkled. But some latter experiences have appeared less favourable, since the eruption is apt to be sometimes more developed on the scrotum and perineum than on the locality of the plaister itself, to the great annoyance of the patient. Were it not for this circumstance I should hesitate less to employ this means. Blisters I have also used, but prefer a more chronic species of irritant. Croton oil in soap liniment, a drachm to the ounce and half, has been useful, but I have only recently substituted it for the first named. In no cases is there any indication for these means unless the affection is severe and obstinate.

Hot hip baths, by which is intended a temperature ranging from 100° to 104°, or even higher, according to the patient's ability, natural or acquired, to sustain it, are among our most useful means. The patient should remain not more than from seven to ten minutes, the object being to make a smart impression on the skin, and fill its vessels, and not to cause congestion of the pelvic viscera, which most undesirable object would probably be attained by keeping him in the bath for twenty or twenty-five minutes. This distinction it appears to me important to maintain. When removed, he should be rapidly dried, wrapped in hot flannels, and placed in bed, or in a recumbent position.

Respecting the internal administration of medicines there is some difference of opinion, at least as to those which possess the most value in chronic cystitis. Those which take the first rank, and on which the most reliance is to be placed, are the following. A short notice will be devoted to each, from which the special indications which should determine the selection for any particular case may be inferred.

The Infusion of Buchu is somewhat stimulant and tonic: its activity in regard of its action on the bladder seeming to be due to a volatile oil, which communicates its odour to the urine. From one to two ounces may be given from two to five

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Buchu.—The leaves of the Barosma crenata and others; a rutaceous plant, from the Cape of Good Hope, introduced into practice in this country, about thirty years ago, by Dr. Reece.

Dr. Prout says, "In chronic affections of the mucous membranes of the urinary organs, . . among remedies of the balsamic class, the mildest, as well as one of the most efficient, is the buchu."—*Stomach and Renal Diseases.* 4th ed. 1848. p. 403.

Mr. Coulson writes, "In my experience, however, no medicine has been so generally successful in irritability of the bladder, as the infusion of buchu. I could cite several cases where it has succeeded after other medicines had failed."—*Diseases of the Bladder.* 5th ed. 1857. p. 85.

Sir B. Brodie believes the use of buchu to be mainly limited to that class of cases in which the bladder affection does not depend on obstruction at the outlet, but on renal disease, and states, "In these I cannot doubt that I have seen it productive of the most beneficial effects." He advises its continued use for a long period, if tried at all, and in doses of one and a half to two ounces three times a day.—*Lectures.* 4th ed. p. 151.

Dr. Gross thinks "its use is occasionally attended with benefit, but has never derived much advantage from it."—*Anatomy and Diseases of the Urinary Organs.* 2nd ed. p. 228.

Dr. Pereira says, "In chronic inflammation of the mucous membrane of the bladder, attended with copious discharge of mucus, times in the twenty-four hours; and it may be strengthened by 20 or 30 minims of the tincture, which is officinal in the Pharmacopeias of Edinburgh and Dublin, although not in that of London. I have no hesitation in testifying to its utility in many cases of irritable bladder, arising from stricture and prostatic obstruction. It is diuretic, but seems to exert a beneficial influence on the mucous membrane of the bladder, and to lessen mucous discharges from it. In a recent case of villous tumor of the bladder under my care, it appeared to alleviate the symptoms very materially. I have derived more benefit from it than from Pareira brava, which has often disappointed me. In consequence of the varied opinions which are expressed respecting the relative value and properties of these several agents by different authorities, I shall cite several of them in notes at the foot of the page, to present at one view the collective experience of those who should be among the best able to judge of this subject.

The decoction of Pareira brava is largely prescribed in this country, chiefly, it is probable, on account of the strong

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it frequently checks secretion, and diminishes the irritable condition of the bladder, thereby enabling the patient to retain his urine for a long period; but I have several times seen it fail to relieve, and in some cases it appeared rather to add to the patient's sufferings."—*Elements of Mat. Med.* 3rd ed. 1853. p. 1913.

PAREIRA BRAVA.—The root of this plant has been prized by different nations for some centuries as an antidote to calculous disorders.

Sir B. Brodie says, "I am satisfied that it has a great influence over the disease (chronic cystitis) which is now under our consideration, lessening very materially the secretion of the ropy mucus, which is in itself a very great evil, and, I believe, diminishing the inflammation in the bladder also."—*Lectures on the Urinary Organs.* 4th ed. p. 112.

commendation it has received from Sir B. Brodie. He advised that it should be made in a more concentrated form, and given in larger quantities than officinally ordered in the late Pharmacopeia. In the present edition accordingly the strength is largely increased, and the dose of this may be considered now as 2 to 3 ounces several times in the day. It may be rendered more powerful by an addition of the extract; such as of from 10 to 30 grains to each dose of the decoction, which then need not exceed a wine-glassfull. I have tried this preparation on numerous occasions, and in the fullest doses, and must confess that I have not obtained the amount of benefit from it I had hoped; generally, it has seemed to exert no influence of any kind. The indication for its use, according to those who advocate it, is not simple irritability of the bladder, but the presence of viscid mucus in large quantity.

The decoction of Uva ursi has also obtained a reputation for its power to check the muco-purulent discharge from the

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Dr. Prout states, "Of the remedies of a tonic and astringent character, the Pareira brava is undoubtedly one of the best we possess in catarrhal affections of the bladder."—*Op. Cit.* p. 403.

Mr. Coulson speaks of it as adapted to irritability of the bladder associated with pain, for which he regards it as "an excellent medicine," adding, that "it may be combined with nitric or nitro-muriatic acid, or dilute phosphoric acid, to lessen the secretion of mucus."—*Op. Cit.* p. 173.

Dr. Gross has never seen any good effect result from its use.—*Op. Cit.* p. 227.

Arctostaphylos Uva Ursi.—An ericaceous plant, the leaves of which have long been employed against calculous diseases.

Dr. Prout writes, "When the kidneys and bladder are more than usually irritable (in the early stages of organic renal disease), . . . I doubt if any remedy surpasses the Uva ursi when judiciously directed."—*Op. Cit.* p. 159. Again: "In chronic bladder, which is so commonly present as the result of irritation of its mucous coat by decomposing urine. It is said to be contra-indicated when any degree of inflammatory action is present, being highly astringent from the large amount of tannic and gallic acid which it contains. The dose is from one to two ounces three or four times in the

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affections of the mucous membranes of the urinary organs, . . . next to the Pareira brava, rank the Uva ursi, and the Lythrum salicaria. These last are, however, more especially beneficial to those forms and stages of the affection marked by irritative excitement, rather than by vascular activity, or by organic disease."—p. 403.

Sir B. Brodie says, "The Uva ursi has the reputation of being useful as a remedy for chronic inflammation of the bladder. I must say, however, that this remedy has generally disappointed me in these cases, and that I have not seen those advantages produced by it which the general reputation of the medicine had led me to expect."—*Op. Cit.* p. 112. Again, in cystitis, depending on renal disease, he states that "it may, in some instances, be employed with much advantage."—p. 150. But fuller doses than usual are advised.

Mr. Coulson speaks well of it, but thinks more highly of buchu. —*Op. Cit.* p. 96.

Dr. Gross says, "I have used it a good deal in the treatment of cystirrhœa, and have occasionally experienced the best effects from it. I have found it particularly serviceable in cases attended with excessive morbid sensibility of the neck of the bladder."—*Op. Cit.* p. 228.

Dr. Pereira writes, "My own experience of it amounts to this, that in some cases the relief obtained by the use of it was marked; whereas in other instances it was of no avail."—*Op. Cit.* p. 1544.

Dr. Wood, of Philadelphia, believes "the credit which it now enjoys is scarcely equal to its merits," and adds, that "in cases of cystirrhœa. persevered in for a long time continuously, for several months if necessary, I believe that it will occasionally effect cures even unaided, and will often prove a serviceable adjunct to other measures."—*Treatise on Therapeutics.* Phil. 1856. Vol. i. pp. 129, 130.

twenty-four hours. If it is desired to strengthen the preparation, 5 to 10 grains of the extract may be added to each dose of the decoction. I have found it occasionally to check mucous discharge and allay irritability, when the preparations previously noticed have failed. Of course its employment unmixed with any other agent is referred to. I have under my care, at the present moment, a marked instance of its utility, in the case of a patient who, having of his own accord resorted frequently to the use of the buchu, pareira, and uva ursi, has found great relief from the last-named after the failure of the others.

Matico,[*] well known as a powerful astringent, appears to have been advantageously employed in a form of cystitis frequently accompanying prostatic enlargement. Dr. Neligan says, "I have found the tincture very useful in the treatment of catarrh of the bladder in the aged."[†] The infusion may also be employed, either with or without the tincture, in doses of from one to two ounces. It possesses a volatile principle, which appears to resemble that of cubebs, and to have a similar action.

A decoction of the Lythrum salicaria was employed by the late Dr. Prout, and considered by him to be very nearly allied in its properties to the Uva ursi (see note on page 118.) It was formerly officinal in the Dublin Pharmacopeia. The dose is from one to two ounces.[‡] On the same authority was recommended an infusion of the Alchimella arvensis, when the urine is alkaline and phosphatic, in which circumstances, says Dr. Prout, "a strong infusion, taken frequently, sometimes gives great relief." * The solvent power for phosphatic deposits, for which this plant has enjoyed a credit, was believed by Dr. Prout to be due to the malic acid which it contains.

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[*] Matico belongs to the natural order, Piperaceæ, from which are obtained the cubebs and other peppers. The infusion, which is generally prescribed, is prepared with an ounce of matico to a pint of boiling water.

[†] Medicines, their Uses and Modes of Administration. 4th ed. Dublin, 1854. p. 76.

[‡] Lythrum salicaria, the spiked purple Loosestrife. It has been employed chiefly in diarrhœa and dysentery, being mucilaginous and astringent. For the decoction, one ounce of the root is boiled in one pint of water.

Dr. Gross quotes cases illustrating the value of the Epigœa repens † in chronic cystitis, with catarrh. It is administered in the form of decoction, the dose being two ounces, frequently repeated. Similarly related to the Uva ursi, and possessing nearly equal claims to utility in the complaint just named, is the Chimaphila, or winter green. It is employed in the form of decoction, in one or two ounce doses, which may be strengthened, when necessary, by the addition of extract.‡ The infusion of wild carrot seeds § must not be overlooked, as exercising a sedative influence in some irritable conditions of the bladder. It has been supposed to be chiefly useful in relieving the strangury occasioned by blisters.

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* Alchimella arvensis: an indigenous plant. It is astringent, and has had an ancient popular reputation for the cure of gravel and calculus. The infusion is made of one ounce of the dried leaves with a pint of boiling water. —*The Nature and Treatment of Diabetes.* 2nd ed. p. 185.

† Op. Cit. 2nd ed. p. 228. Epigœa repens, the Trailing Arbutus—diuretic and astringent. The decoction is made with one ounce of the dried leaves boiled in a pint of water. This plant appears to be nearly related to the Uva ursi. Another American remedy is the Phytolacca decandra, or Virginian Pokeberry, employed in order to alleviate simple irritability of the bladder. Dr. Gross says, "Dr. Physick was in the habit of prescribing, with decided success in this affection, the saturated tincture of pokeberries. He gave it in two-drachm doses, every seven or eight hours."—*Op. Cit.* p. 262.

‡ Chimaphila umbellata has long enjoyed a considerable reputation in America, both in urinary complaints and in scrofula, for which latter it has been considered a specific. It is diuretic and astringent. For the decoction, boil one ounce in a pint and a half of water to one pint, and strain.—*L. Ph.*

§ Daucus carota, common or wild carrot. An ounce of the seeds to a pint of boiling water are the quantities for infusion. Dose, two to three ounces every two or three hours.

All the foregoing act probably, to some extent, by means of their diuretic properties; inducing a flow of watery urine, and so reducing the stimulating qualities of that fluid; while a certain amount of astringent action may possibly be exerted directly upon the mucous membrane, and so avail to repress the undue discharge of its secretion. In some, of which the buchu is the most marked example, the volatile oil contained may, besides acting as a diuretic, exert some influence, so called specific, upon the vesical mucous coat, of a calmative kind, when that membrane is in that state of irritation or excitement, commonly known as chronic inflammation, with catarrh. That this is probable appears indicated by the known similar result of administering some of the balsams under the same circumstances, all testifying to the value of small doses of copaiba in chronic catarrh of the bladder. It is worthy a trial, and is often productive of amelioration of the symptoms. If beneficial at all the result is soon apparent, and there is therefore nothing gained from pushing it, either by increased doses, or by a long administration of the remedy. Indeed any increase of the dose beyond 5 or 7 minims appears to diminish the beneficial effect. It may be rubbed up with 15 or 20 minims of liquor potassæ, with a little acacia, and an ounce and half of camphor mixture, or some bland vehicle. In whatever way it acts, the patient frequently experiences relief when micturition is difficult, and the urine is loaded with pus and mucus.

The Chios turpentine has been recommended, in doses of 4 or 5 grains, by Sir Benjamin Brodie. Both this and small doses of Cubebs pepper, 10 to 20 grains, have been found useful in checking inordinate catarrh. The volatile oil may be substituted for the powder if preferred, in doses of 10 minims, on sugar, or in mucilage.

Mr. Coulson speaks well of another balsamic remedy, viz. the compound tincture of benzoin in drachm doses three times a day.[*]

Another class of useful agents is the Demulcents. These are, for the most part, simply mucilaginous, or starchy solutions, which form an agreeable means of diluting the renal secretion, at the same time that they furnish some little nutriment to the body, and in some instances, perhaps, some special therapeutic influence. They are therefore often useful vehicles for the administration of the acids and the alkalies, when these are required; although originally given on account of certain soothing and sheathing qualities to the urinary tract, which, by virtue of their mucilaginous character, they were supposed to possess, there is no ground whatever for attributing their beneficial influence to that especial character, which must necessarily disappear in the process of digestion and assimilation.

Among the most useful are the decoction of marsh mallow, or of the common mallow in its absence; the decoction of carrageen, or Irish moss; the infusion of linseed; the decoction of barley, better known as barley-water, and a solution of gum arabic in water.[*]

Another remedy, which has obtained a considerable reputation in America for urinary diseases, and has recently been imported into this country, is the inner bark of the slippery elm, Ulmus fulva. It appears to possess little besides demulcent properties, but these certainly in a high degree. Tannic acid, in small quantity, is also present. The infusion forms an agreeable drink by itself, and offers a good vehicle for other agents. The following formula, which I have employed, answers extremely well. Macerate one ounce and a half of the bark in one pint of boiling water for six hours; press thoroughly, and strain. The United States Dispensatory orders one ounce to the pint of water, but the liquor is not sufficiently mucilaginous. By decoction the bark yields other matters, which render the solution disagreeable and indeed useless.

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[*] Op. Cit. p. 169.

[†] As good formulæ for these simple yet useful vehicles are often wanted, I have subjoined those which, having frequently employed, I know can be depended upon :—

Decoction of Marsh Mallows.—Boil three ounces in three pints of water until reduced to two pints.

Decoction of Irish Moss.—Clean and wash an ounce of the moss, afterwards boil in a pint and a half of water until it is reduced to one pint. Any proportion of the water may be replaced by milk, when required to be more nutritious.

Decoction of Linseed.—Boil an ounce of unbruised seed in a quart of water for an hour.

Decoction of Barley.—Boil two ounces in a pint of water for five minutes, and throw away the liquor. Add two quarts of water to the barley, and reduce by boiling to one quart.

Gum Water.—One ounce of pure gum dissolved in one pint of water.

In regard to the efficiency of each one of the principal medicinal agents which have been enumerated, it is impossible to overlook the fact that the most opposite opinions are held by experienced practical surgeons. Nor is it possible to resist the conclusion that either the virtues of these agents have been overrated, on the ground of estimates formed from the observation of some successful but exceptional cases—that is, of cases which have progressed very favourably under the use of the medicine, but which have been in reality examples of *post hoc*, rather than of *propter hoc* improvement—or that the selection of the remedies specially adapted to each form or phase of the complaint has often not been happily made; inasmuch as the appropriate and particular indications for the use of it have not been accurately defined, or, indeed, discovered; so that the successes have been due in part to chance, and are capable of being multiplied by more skilful adaptation.

The latter suspicion is not without foundation, and it is far from improbable that the three chief and most popular remedies in urinary difficulties are sometimes, perhaps not unfrequently, prescribed somewhat empirically and at random. This opinion is strengthened by the better success which is said to result from their employment in combination, a method which is more popular abroad than in this country. I had, some time since, an American patient with cystitis from obstruction, who had long experienced great benefit from the following mixture, and I may confess to having prescribed it with advantage in similar cases subsequently:—

℞. Fol. Uvæ ursi.
Rad. Pareiræ bravæ āā ℥ij.

Boil together in three pints of water until reduced to two, and strain. Two or three ounces to be taken from three to five times daily.

To this, when cold, tincture of buchu may be added if desired.*

The indications, then, which I believe will best guide us in the selection of the principal remedial agents enumerated may be briefly pointed out as follows:—

Chronic mucous discharge from the bladder in large quantity, associated with relaxation and debility, no inflammation being present, may be acted upon by the astringent tonic Uva ursi; or this may be conjoined with pareira, for which the latter, as well as the former, has been recommended. Chimaphila is equally appropriate in this form of complaint. In simple irritability of bladder—that is, when the desire to make water is frequent—in the absence of the causes or symptoms of any active inflammation, Uva ursi, perhaps, of all the others, affords the best chance of relief.

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* An illustration of the Transatlantic mode of prescribing these remedies is given by Dr. Gross, in his work already referred to: "A combination of some of the articles above mentioned may often be advantageously employed. Indeed, the effect is usually much more conspicuous when they are given in this manner than when they are used separately. I have long been in the habit of administering, with the happiest effect, a combination of buchu, uva ursi, and cubebs, sometimes in the form of an infusion, but more generally in that of a tincture, given several times a day, in conjunction with a small quantity of bi-carbonate of soda. Occasionally a few drops of the balsam of copaiba, the muriated tincture of iron, or dilute nitric acid, may be advantageously added to each dose of these medicines."

Dr. Gross adds, naturally enough, "When thus combined, it is of course impossible to determine what merit is due to each respective article." p. 229.

When there is some chronic inflammation present (not acute) as evidenced by irritability of bladder, some little pain above the pubes, and considerable tenderness experienced when a catheter is passed, certain kinds of volatile oil, which are excreted by the kidney and impregnate the urine are frequently beneficial. One of the mildest, safest, and most easily-digested forms is that found in the infusion of buchu. It may be used alone, or it may be replaced by a few minims of turpentine or copaiba, but these are more prone to disagree with the stomach; yet they sometimes exercise a beneficial influence when the buchu has failed, more especially in cases where much catarrh is present also.

An important point in the employment of the decoctions and infusions in question is to give them liberally. The ordinary doses by tablespoons are, I think, almost valueless. From ten to twenty ounces must be given daily in order to obtain benefit in most cases. At least, I have obtained advantage thus after failing with smaller quantities. Formerly, they appear to have been so administered.*

In this place may be mentioned an excellent combination, for which I am indebted to Dr. Gross, useful in irritable, and even in some inflammatory states of the bladder. One ounce and a half of the leaves of Uva ursi, and half an ounce of hops, infused in two pints of boiling water in a closely-covered vessel for two hours : a wineglass of the liquor to be taken several times a day. Dr. Gross writes—it "often acts like a charm; promptly allaying the pain and spasm at the neck of the bladder, and powerfully promoting resolution."[*]

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* Half-pint doses, two or three times a day, are recommended of a decoction of Uva ursi and Pareira brava combined, in Blackie's Disquisition on Medicines that dissolve the Stone, &c. London, 1771. p. 182. This is but one illustration among several which might be referred to of similar date.

But further, it cannot be overlooked that these various infusions and decoctions have been generally administered in combination with other agents, and with the use of other means, which have, perhaps, really contributed largely to the favourable result, although from circumstances they have not been permitted to share the credit. The agents referred to are the acids and the alkalies. It has been by no means common to prescribe the vegetable solutions in question unmixed with one or other of the two very important classes of bodies just named; and much observation of their effect when uncombined will be necessary before their specific properties are known more accurately than at present.

This remark brings us to the consideration of the influence of these chemical agents in chronic cystitis.

The mineral acids are constantly ordered when the urine is alkaline, and has a tendency to deposit earthy phosphates. But it is by no means in numerous cases that even full doses by the mouth can be depended upon to exert any marked influence over the chemical reaction of such urine. As general tonics to the system, in such circumstances often much needed, they are undoubtedly useful. But it is far otherwise with the opposite class—the alkalies. By their means it is in our power speedily and powerfully to act on the kidney secretion, and to change an acid to a strongly-alkaline urine if it be desired. They have long been regarded almost in the light of specific sedatives to the bladder under circumstances of inflammation or irritation, and are perhaps entitled to more uniform confidence in such cases than any other remedies known.* Such, at least, is, without hesitation, my own experience. Additional light has been thrown upon this subject by the observations of Dr. Owen Rees. He has been led to the belief, that even when the urine is alkaline alkalies are often productive of a greater amount of benefit than any other remedy, allaying the irritation produced in the viscus by urine of that character, and tending to restore it to its normal acidity. It appeared to Dr. Rees, to quote his own language, "that an alkaline state of urine very frequently resulted from disease of the mucous surfaces over which the urine had to pass before excretion, and that urine which had been secreted of healthy acid character was, owing to this condition of the membrane, often passed of strongly alkaline reaction, and containing a deposit of the earthy phosphates as a consequence. The patient, in fact, was secreting healthy urine, * * * * * the variation from the normal state consisting in the urine being rendered alkaline by disease of the mucous surface of the urinary passages. That the discharge from the urinary mucous membrane, when inflamed, was of a strongly alkaline character, and sufficient in quantity to neutralize the acidity of healthy urine, I proved by an experiment on the inflamed surface presented by the fundus of an everted bladder which I examined in a case of deficient parietes of the abdomen, a congenital deformity not very uncommonly met with. In confirmation of the above views, I took the opportunity of adducing the fact that in several cases of alkaline urine I had succeeded in obtaining the secretion of healthy acid reaction by rendering the urine less acid on secretion, and therefore less irritating, and by perseverance in this plan till the inflammatory condition subsided, the normal acid reaction of the urine, as it passed from the bladder, was eventually obtained." *

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[*] Op. Cit. p. 186.

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* This view is taken by Mr. Adams. Anatomy and Diseases of the Prostate Gland. 2nd ed. 1853. pp. 42, 43. He compares their influence to that of quinine in neuralgia, giving the preference, among the ordinary alkaline salts, to carbonate of soda.

Proceeding on this principle, Dr. Rees recommended those salts in which the alkali is combined with a vegetable acid, especially the citrate of potash, and the tartrate of potash and soda; the latter if the bowels require a laxative, and the former if this is not the case. Both exercise a powerful influence in neutralizing the acidity of the urine, notwithstanding the aperient action which is associated with one of them. I have had many opportunities of witnessing the good effects which have resulted from their employment in my own practice, particularly of the citrate of potash, which I have for some years past been in the habit of recommending as a habitual drink, so long as it is desirable to produce an alkaline effect upon the urine; and in a series of papers on Irritability of the Bladder, which appeared in the *Lancet* in 1854, I stated that it had proved in my hands often more useful for such a purpose than Vichy water (vol. i. p. 439). Its value in this respect was observed and pointed out not less than half a century ago.† But it is not invariably that alkalies exert a beneficial influence in these cases. On the contrary, I have seen the alkaline state of the urine decidedly increased by their moderate use.

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* On the Pathology and Treatment of Alkaline Conditions of the Urine. By G. Owen Rees, M.D., F.R.S. Guy's Hospital Reports. Third Series. Vol. i. 1855. pp. 300, 301.

† It is interesting to observe that it is no new observation that the salts, formed by a combination of the vegetable acids with the alkaline bases, are capable of communicating, when taken by the mouth, an alkaline reaction to the urine; although it is, comparatively speaking, a recent achievement of chemistry to explain this. More than fifty years ago Sir Gilbert Blane was in the habit of prescribing citrate of potash for the express purpose of rendering the urine alkaline. See his paper "On the Effects of large Doses of mild Vegetable Alkali," read Nov. 1, 1808, to "the Society for the Improvement of Medical and Chirurgical Knowledge."—*Trans.* vol. iii. p. 339.

Although easily prepared extemporaneously from citric acid and bi-carbonate of potash, it is more agreeably administered from bottles, as an aerated water. An excellent solution of half a drachm of the salt in each bottle is prepared by Messrs. Sandford and Blake, of Piccadilly.

Benzoic acid is a remedy which has succeeded with me after all other means have failed, in producing acid in the place of alkaline urine, and restoring the patient to comparative ease. A brief report of a case which I not long since watched very closely at the Marylebone Infirmary will illustrate its effects, of which I could subjoin other examples.

CASE No. III.

Prostatic Enlargement not considerable; occasional Engorgement of Urine and Overflow; Chronic Cystitis; Alkaline Urine and much Irritability of Bladder. Complete Relief.

J. B.—Aged 68.

Admitted to the Marylebone Infirmary under my care, Sept. 13, 1855.

For two years past some difficulty in passing urine, pain above pubes, irritability of bladder, and other signs of cystitis from obstruction, prostatic.

Admission.—Passed a No. 10 catheter, drawing off thirty-six ounces of urine. General condition rather weak. Is distressed by loss of sleep from frequent micturition, and constant pain, not severe, in back, loins, &c. Urine ammoniacal, not fetid; cloudy; little tinged with blood; when cold deposits much tenacious mucus, pervading the whole of the fluid; strongly alkaline; no albumen. Under microscope—many pus corpuscles; a few blood discs; many large, round, granular-looking corpuscles; few triple phosphates.

Sept. 14.—Ordered—Ac. nitric. dil. ♏xx., ex aquâ; 4tis horis.

18.—Urine has been daily removed by catheter from the bladder: residue not large: as alkaline as before. To take the acid every two hours.

20.—Urine the same. Substitute hydrochloric acid for nitric, every two hours.

K

Sept. 23.—Urine perhaps slightly less alkaline. Sounded carefully for calculus, but found none.

25.—Apply—Emp. picis, cum antim. tart. ʒss.; to the hypogastrium.

27.—Altogether better. Urine less alkaline. Plaister has irritated him.

Oct. 1.—Urine neutral. No suprapubic pain, except of skin. Pustulation limited to outline of plaister. To leave off acid.

4.—Urine strongly alkaline.

To resume—Ac. hydrochloric. dil. ♏xx, 2dis horis.

7.—Urine slightly alkaline.

9.—Urine faintly acid. Altogether greatly improved. To leave off acid.

13.—Urine alkaline. To recommence the acid.

18.—Urine still alkaline.

24.—As before.

Ordered—Pot. bicarb. ℈j, four times a day in water. Alkaline treatment was continued, with variations in the quantity and form, for about three weeks, with no improvement.

Nov. 14.—Urine strongly alkaline.

Ordered—℞ Acidi Benzoici ℈j.
Sp. Vini rect. ʒiss. Haust. ex aquâ—quaque 6tis horis.

18.—The urine faintly acid. All symptoms decreased.

22.—Has discontinued the benzoic acid, and the urine has again become alkaline. Recommence benzoic acid.

25.—Urine more decidedly acid than before observed.

Dec. 16.—The acid was again discontinued, and the urine became slightly alkaline. He returned to its use, the urine rapidly became acid, and he was soon much improved generally. The residual urine disappeared; he ceased to require the catheter, and was discharged without any bad symptom.

The improvement in the urine, especially at first, was doubtless due in great measure to rest and regimen; but it was clear that the mineral acids, in large and very frequently repeated doses, exercised slowly some power, not considerable, over its reaction. The alkalies were not only of no service, but appeared, indeed, rather to increase the evil. But the influence of the benzoic acid was much greater and more rapidly manifested on the condition of the urine than that of any other agent employed. The excellent final result was doubtless greatly due to the catheterism, and perhaps to the counter-irritation, in addition to the other means named.

Benzoic acid is extremely insoluble in water, which vehicle is, therefore, not well adapted for its administration. Twenty grains require a drachm and a half of rectified spirit for solution, which may be taken in a wine-glass of water, when it is precipitated in a very divided state, and should be instantly swallowed. Or it may be given in powders, rubbed up with a half or equal weight of white sugar; or it may be suspended in simple syrup, or in the mucilage of acacia.

Irritability of bladder, with pain increased during the repeated efforts to make water, is one of the most distressing accompaniments of the affection. The patient becomes worn and exhausted by loss of rest and sleep, if these are not ensured by sedatives and opiates; the latter, especially, being usually of great value. Generally speaking, opiates by rectum exert the best influence, and may be administered either in the form of suppository or enema. From one and a half to three grains of the extract of opium, or the same quantity of powdered opium, or half a grain to a grain of morphia, made up with six or eight grains of the simple cerate of the London Pharmacopœia, are good forms for the purpose. A grain of extract of belladonna is sometimes a good addition when much spasmodic action is present. A combination with a few grains of hyoscyamus, conium, or lactucarium, may occasionally be made with advantage. A common form is ten or twelve grains of the pil. saponis cum opio; but a better vehicle for the active drug is the cerate just referred to, which possesses no irritating qualities, the effect of which in the soap is sometimes complained of. The butter of the cacao nut has also been of late employed, and for the same reason.*

When enemata are employed, they should be small in quantity and mucilaginous; as, for example, one or two ounces of starch or barley-water, containing from forty to sixty minims of laudanum. The fluid form ensures a more rapid action, when such is required.

At the same time we may administer internally morphia, or some other preparation of opium, in quantity appropriate to the patient's condition; and it is usually well borne, and of great value in these cases. Where, unfortunately, it does not agree, we must have recourse to conium, belladonna, or Indian hemp, or to full doses of hyoscyamus, or extract of hop. Sometimes large doses of camphor produce a powerfully sedative effect; one or two teaspoonfuls of the ordinary spirits of camphor may be given in three or four ounces of water, or of infusion of hop, for this purpose.

Where there is phosphatic deposit in the urine, while this is loaded with mucus and is ammoniacal or fetid, much benefit may often be derived from injecting the bladder. Indeed, these are the circumstances in which this treatment is especially applicable. The formula most generally employed is the dilute nitric acid, in the proportion of one drachm to the pint of water, which is sufficiently strong to commence with, afterwards gradually increasing to, but not exceeding, two drachms. It is scarcely necessary to say that where there is much purulent secretion, and more especially if there is sanious discharge, and great pain is experienced, this remedy is contra-indicated. Sir Benjamin Brodie, who long ago advocated this practice in the treatment of cystitis, says:—"It is better to begin with washing out the bladder with a little tepid water; then to inject the acid solution, allowing it to remain for not more than thirty seconds in the bladder. At first the operation should not be repeated oftener than once in every two days, afterwards it may be repeated once daily, but never more frequently than this."* The quantity thrown in must depend upon the capacity of the bladder, and will vary from two to four ounces. It may be added, on the authority just quoted, that injections "are especially to be avoided where the mucus deposited by the urine is highly tinged with blood."*

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* The following are excellent formulæ for suppositories :—

℞ Morphiæ hydrochloratis, gr. ½ to j.
Butyri cacaonis,
vel Cerati, gr. x.—Misce bene; fiat suppositorium.
℞ Ext. Belladonnæ, gr. j.
Pulv. opii, gr. ij.—iij.
Butyri cacaonis,
vel Cerati, gr. vij.—Misce bene.

These are not only unirritating, but of good consistence for use, and are readily soluble at the temperature of the body.

The following is one recently recommended by Dr. Simpson :—

"Take of acetate of morphia, six grains; sugar of milk, one drachm; simple cerate, half a drachm, or as much as may be sufficient to make a proper consistence, and divide the mass into twelve suppositories; then dip each suppository into the following mixture, to form a coating: take of white wax one part, lard plaister two parts; melt together. The best way is to insert a needle into the apex of the suppository, dip it into the melted wax and lard, and immediately afterwards into cold water, to harden it before it loses its shape. The shape is conical, like a pastile."—*Medical Times*, Feb. 7, 1857.

A very frequent accompaniment of enlarged prostate is the appearance of blood in the urine. It may be simple, unprovoked hæmorrhage from some part of its surface, or it may be the result of passing an instrument. In the latter case, it will sometimes take place although passed with the greatest care and without pain, so ready to bleed is the organ in some states when enlarged; but this is an exceptional occurrence. It may be caused by the patient moving about after the catheter has been passed, while it still remains in the canal; supposing, for example, that it has been passed in the recumbent position, and that the patient rises to evacuate the fluid. Some cases there are in which although the instrument passes without obstruction, or even causing any painful sensation, it is nevertheless exceptional not to see a little blood at the time or soon afterwards. *A fortiori*, hæmorrhage may occur, and to a large extent when the employment of the catheter is difficult, or occasions pain. This circumstance is said to indicate ulceration of the organ. It may be so in rare cases, but I know that it often happens when no breach of surface can be found after death. It is not improbable that the hæmorrhage takes place from enlarged and congested vessels in the mucous membrane of the bladder, the veins from which are often pressed upon and probably obstructed when the prostate is enlarged.

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* Lectures on the Urinary Organs, pp. 114, 115.

When hæmorrhage is very slight, it requires no special treatment beyond an attention to increased care in the use of instruments, and the observance of perfect quiet in the recumbent posture for a short time after passing one. A change from an elastic to a silver instrument, or the reverse, will sometimes cause it to disappear; or the employment of one that is one or two sizes smaller than that which has been habitually used. If the amount lost is sufficient to threaten or produce any appreciable effect on the patient's general condition, it will be necessary to use internal remedies. The surgeon may then select from the following, or try them, if necessary, in succession, if the first attempt is unsuccessful. Gallic acid, five to seven grains, with or without a few minims of the liquor opii, three times a day, or more frequently if necessary; sulphuric acid in infusion of roses; acetate of lead and opium; or ten to fifteen minims of turpentine, suspended in mucilage, and frequently repeated. Sometimes preparations of iron are indicated, and may be given in the form best adapted to agree with the patient's stomach. Mr. Adams prefers the use of alkalies in these circumstances, stating that—"of internal remedies, the simple salts of soda and potash, as the carbonates, in small and repeated doses, are decidedly preferable to acids."* If the hæmorrhage is considerable, the bladder becoming distended, which sometimes happens to an enormous extent, a large tumor being definable, extending midway towards the umbilicus, or higher, other means must be adopted. Bladders containing ice should be applied to the perineum and hypogastrium, the patient maintaining the most perfect quiet in bed, his person being lightly covered, and the bed-clothes elevated from the body by means of a cradle. Two or three ounces of ice-cold water may be frequently injected into the rectum, if it can be done without disturbing the patient too much by producing action of the bowel, which in this quantity it is not likely to do. It is recommended that a catheter should be passed into the bladder and the clot broken up; and that efforts to remove portions of this should be made by applying an exhausted gum-bottle, or syringe, to the instrument. I must venture to dissent from the injunction to interfere, unless it is rendered absolutely necessary by retention of urine, which I can scarcely believe can be occasioned by the presence of the clot. I am sure I have seen fresh hæmorrhage excited by this practice. The most satisfactory result in my own experience was one in which, after first passing the catheter to verify the state of matters, I declined all mechanical interference. The bladder was in this case remarkably hard, feeling above the pubes like the uterus of a pregnant woman. The patient was very exsanguine, and had a small and very feeble pulse. I ordered gallic acid and opium every hour, the latter until it allayed the painful and spasmodic straining to evacuate the contents of the bladder, which is usually present, and causes great distress; and nutriment in teaspoonfuls constantly; ice locally, and absolute quiet. Fresh blood ceased to ooze by urethra, and in a few hours, urine so thick and deeply coloured as to resemble grumous blood, passed. In the course of forty-eight hours it gradually became lighter in colour, the bladder smaller, and ultimately the whole of the clot was dissolved, and came away in solution. The patient is at this moment perfectly well. The indications appear to me to be exceedingly plain not to interfere, provided there is not absolute retention. The breaking up or otherwise disturbing the clot is liable to provoke fresh bleeding; the hasty removal of the vesical contents is extremely likely to open orifices of vessels now closed by plugs of clot within them, and pressed upon by the contained mass, besides affording a fresh cavity into which more blood may be poured. Besides, there is no ground for regarding the clot as a great evil, which must be got rid of at all hazards; much less for adopting such means, recommended on no mean authority, as injecting several ounces of a strong mixture of acetic acid and water into the bladder in order to dissolve it. The solvent power of the urine, possessing as it does a temperature of about 100° Fahr., has appeared to me remarkably great, and is probably not only one of the most efficient, but the very safest of agents in effecting the purpose.

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* Op. Cit. p. 116.

It does happen in a few cases that some of the mechanical means above referred to must be adopted to remove firmly-adhering coagula, and the bladder has even been opened above the pubes for that purpose;* but such necessities are happily extremely rare, and I am persuaded that we shall, in the majority of cases, conduce more certainly to a favourable result by permitting nature to do her own work, without any undue haste on our part to be officious in offering her assistance. It is true that the distress occasioned to the patient by the urgent sensation of the want to micturate and desire to empty the bladder, besides the pain and spasm sometimes, although not always, associated with this state, indicate that something should be done for the removal of the coagula. In these circumstances, especially if the patient is much reduced, the use of opium, either by the mouth or rectum, will relieve much of the distress, and we may still trust somewhat to the course of events for relief, without resorting to instruments. When it is necessary, however, to use these, it must be done with the greatest caution, since the neck of the bladder, which is probably the source of the hæmorrhage, must be exposed to some disturbance and pressure by all movements of an instrument made within its cavity. Nevertheless, the necessity existing, a full-sized catheter should be passed, and a syringe, or stomach-pump, adapted to it, by means of which a considerable portion of clot may be withdrawn. In relation to the subject of internal remedies in cases of extreme urgency, when the most powerful astringents we possess must be freely administered, it should not be forgotten that Sir B. Brodie records a case in which, all other remedies having failed, a dose of Ruspini's styptic, repeated two or three times in the course of twelve hours, was followed by complete cessation of the bleeding.* The tincture of matico has been also recommended, and, if employed, should be frequently given, and in not less than drachm doses. It contains, however, no recognized astringent principle: its use in other affections of the bladder has been already referred to.

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* Mr. A. Copland Hutchinson, with the concurrence of Sir A. Cooper, opened the bladder, from above the pubes, and removed a pint of coagulum, only twelve hours after the occurrence of hæmorrhage. He felt enlargement of the prostate from the cavity of the bladder. The patient died three days after the operation, and no *post mortem* was made.—*Lond. Med. Repository*, vol. xxii. p. 128. 1824.

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* Op. Cit. p. 201.

A distressing result of enlarged prostate is sometimes incontinence of urine. By this I do not refer to the overflow from engorgement relievable by the catheter, usually termed incontinence, which has been already fully considered, but a real inability on the part of the bladder to retain more than, at all events, a small quantity of urine—a condition, therefore, in which the calls to make water are frequent, and cannot be resisted. As soon as the bladder has received some one, two, or three ounces of urine, it begins to flow, in the absence of any voluntary efforts on the part of the patient. This may occur, although rarely, as has been already shown in the fifth chapter, from peculiarity in the form of the enlargement, preternaturally opening the vesico-urethral orifice. If, then, the frequent micturition does not depend on a cause relievable by medicine, such as that occasioned by irritability or inflammation of the mucous membrane of the bladder, but on some organic source of the kind described, a proper receptacle (often useful in the latter case also) is the principal remedy, and should be almost constantly worn. Such are manufactured of india-rubber, and they most efficiently provide for the necessity. They are, however, too well known to render any description necessary here.

The last result of obstruction at the neck of the bladder from enlarged prostate is a susceptibility to congestion and inflammation in the organ from very slight causes, and its management will close this section of the subject of treatment.

Various circumstances, of which the most common are sitting on a damp or cold seat, especially out of doors, general exposure to cold, the movements encountered in a long journey, horse exercise, indulgence in alcoholic stimulants and sexual excitement, will produce in a sudden manner an attack of increased difficulty in making water, and occasionally a profuse discharge from the urethra of a muco-purulent character, sometimes tinged with blood. These symptoms are generally accompanied by others of ordinary fever, although of a mild form. Such attacks sometimes produce a good deal of alarm; but they usually subside rapidly with rest in bed, hot fomentations, hot hip-baths, a mild aperient, and sedative treatment: warm enemata may also give relief. The bladder must be relieved in the usual manner, but generally with a smaller elastic catheter than might be otherwise employed if the urethra is swollen and tender, as it commonly is. Occasionally, also, a few leeches to the perineum, or around the anus, are useful. Dry cupping to the perineum is sometimes equally efficacious, and may render the loss of blood unnecessary. The treatment may not be otherwise antiphlogistic, as the age and constitution usually met with in these patients indicate a full amount of support, in the form of good nutritive food, although without stimulant, or with a small proportion only. Such attacks are rather congestive, or subacute inflammatory affections of the urethra and prostate, and are widely different from the affection commonly known as prostatitis, and considered in a subsequent chapter.

2. The general treatment and management of patients with enlarged prostate is next to be considered.

It is of great importance to maintain all the functions of the body in healthy action in treating patients who thus suffer. Slight derangements in other parts of the system are very prone to augment the urinary symptoms. A simple catarrh, a fit of indigestion, or unrelieved constipation, are very apt to produce increased obstruction or greater irritability of the bladder. The principles, then, on which the diet, regimen, and general management of the patient are founded, it is by no means difficult to understand and apply. Modifications will be necessary for every individual case, but a general plan may be sketched here, from which material deviations will not probably be often necessary.

First, in the matter of diet, the patient should restrict himself to such plain, simple, but nutritious food as his experience has shown that he can easily digest. Moderately cooked, tender and juicy meat, of which the best in most circumstances is mutton, should be taken at least once a day, varied by poultry and game, and occasionally fish, with well-cooked vegetables, or fruit, in moderate quantity—the former habitually, the latter occasionally; home-made bread, not less than thirty-six hours old; fresh milk if it agrees with the stomach, eggs in moderation, and farinaceous puddings, furnish the principal varieties of food from which the diet should be selected. All that tends to derange the stomach and bowels, to tax unduly the digestive powers, or to over-excite the circulation, must be avoided. Pork, and salted or dried meats and fish, highly-seasoned dishes, rich soups or gravies, pastry, cheese, dessert in all its indigestible variety, strong tea and coffee, all unripe, and most uncooked fruit, all raw vegetables and pickles, should be unhesitatingly denied. The question of alcoholic stimulants is often entirely an individual one, for which express rules cannot be given, except that in no case is more than a strictly-moderate use of such to be permitted. There are many, however, I firmly believe, of these cases in which the withdrawal of the accustomed two, three, or four glasses of sherry per diem would be a positive injury: where, during a considerable number of years, this moderate indulgence has been allowed, and often, *à fortiori*, where it has been exceeded, we shall inflict an injury by withholding it. In most cases, a light and dry sherry of the first class is the best kind of stimulant. Port-wine is not generally admissible, often wholly to be avoided, as are spirits also. The substitution of the lighter wines of the Rhine or of Bordeaux is in some cases permissible, but in advising this we must be guided by the previous habits, experience, and the constitutional tendencies of the patient. There are other cases, perhaps exceptional, in which light bitter ales agree better than any other dietetic stimulant. Whatever is selected of this kind should be regarded as the single article of use, and variety should never be indulged in. During any access of inflammatory symptoms, the stimulant should generally be withdrawn; and, lastly, it may be affirmed that where the patient has not been accustomed to it, or if he feels certainly as well, if not better, without it, its disuse is undoubtedly indicated.

The clothing should be such as encourages and maintains a due action of the skin. Flannel or woollen garments should cover the trunk and the limbs, and all changes of temperature should be efficiently provided for. The patient often suffers, as the season of autumn approaches, from a foolish prejudice against unnecessary wrapping. The lighter summer flannels should, early in this season, be exchanged for a heavier description. Any chill or check to the transpiration by the skin is attended with danger of internal congestion of the prostate in the subject of enlargement. Damp must be sedulously avoided, or removed after exposure, especially from the feet, without delay: the lower limbs should be kept habitually dry and warm, a habit of the first importance, as freedom of circulation and healthy vascular action here is one safeguard against the recurrence of congestion elsewhere, and particularly at the point which demands especial protection.

The healthy functions of the skin must be promoted by habitual tepid sponging, and occasional warm-baths, both always followed by well-applied friction with the rough towel or horsehair gloves. The warm foot-bath should be frequently employed on the principle just alluded to.

The question of exercise is one of importance. The subject of enlarged prostate must not be encouraged to believe himself too much an invalid, but must exert his physical powers, as far as they exist, in daily exercise in the open air, of which walking is decidedly the best form. Riding is generally out of the question; the movement of trotting is undoubtedly prejudicial, and I have several times seen bleeding caused both by it and by a long drive over rough roads, or indeed after a long railway journey; and, at the same time, increased difficulty in micturition. On ordinarily smooth surfaces, carriage exercise may be added to, but should not supersede, that of walking, where the latter can be taken; if not, the former must be substituted. No exercise should be carried to undue fatigue, and after it, rest in the horizontal position is desirable. Neither should the patient withdraw too much from intercourse in cheerful society, as some, under a morbid sense of the gravity of the complaint, are very apt to do. This, often encountered at the onset of the symptoms, gradually gives way in some cases to a very remarkable extent; while in others the complaint becomes a mental incubus, which depresses the patient for the remainder of his days, and probably tends to shorten them materially. The patient should be reminded how many men there are who have long been the subjects of prostatic enlargement to an extent rendering it requisite that they should remove from the bladder the whole of their urine, by means of the catheter, from inability to pass any by their own efforts, and who, nevertheless, are so actively engaged in the pursuits of life, whether those of business, or merely of pleasurable occupation, that their daily associates are often wholly ignorant of their infirmity.

The habitual tone or temper of mind exhibited by the patient is to be noted, since there is no manner of doubt that an unhappy and desponding one is prejudicial to its victim; will tend to encourage the steady progress of disease, and unnerve his constitution for resisting its casual attacks. The opposite state must be sedulously encouraged, not merely as an important therapeutical means, which it nevertheless is, but as the legitimate result of a proper estimate of his complaint, so susceptible of palliation, so slow in progress as it is in the majority of cases, where judicious care and management are exercised. To assist in producing this healthy and natural state of mind, the mere assertion of the propriety of cherishing it is not sufficient; occupation of a cheerful character, suited to engross the thoughts and energies of the patient, should be found, if possible. I have observed that those whose lives are little, if at all, shortened by the complaint, are almost uniformly men who are interested and engaged in the daily pursuits of business or professional occupation; men who take the brightest view of their trial, and who by strangers may be regarded as persons of average health. It is far otherwise with those whose time hangs heavily on their hands, who are oppressed with ennui, and who, naturally enough, acquire a habit of brooding over their complaints, and permitting their thoughts ever to be in contact with the painful subject, until it acquires exaggerated proportions, and exercises a mastery over the mind, which it is intensely difficult to shake off. The mental and moral management of such is sufficiently indicated by these few remarks, which a sense of their importance has impelled me to make. Before leaving this subject, the necessity for reminding the patient of the evil effects which may result from great excitement of all kinds should not be overlooked. Mental disquiet and anxiety when excessive I have seen exerting most unhappy influence upon the urinary function in these cases. Undue indulgence in sexual excitement must be similarly guarded against; it may be even necessary occasionally to advise abstinence from intercourse, when obviously followed by the mischief which in some cases results.

3. The special treatment to be directed against the enlargement itself.

This resolves itself into two distinct parts:—The medical and the mechanical.

The medical treatment has been hitherto marked by uncertainty, not to say inefficiency, as to any power exhibited in effecting a reduction in the size of the enlarged organ. Nevertheless many agents have been administered for this purpose. One of the earliest on record is hemlock, which probably gained its reputation, or rather its introduction into practice against enlarged prostate, independently of its ancient celebrity even from the time of Pliny for the "reducing of all tumors," from a remark of John Hunter to the following effect: "I have seen hemlock of service in several cases. It was given upon a supposition of a scrofulous habit. On the same principle I have recommended sea-bathing, and have seen considerable advantages from it, and, in two cases, a cure of some standing."* There can be no doubt from the tenor of this passage, that Hunter alludes to the enlargement, which occurs from effusion after acute inflammation in young subjects, and not to the totally different affection now under consideration, a distinction which even now does not seem to be always sufficiently maintained. On the next page we learn that Hunter had heard of the virtues of burnt sponge in a single case; and in another, of benefit derived from a seton in the perineum, as long as it continued open; the age of the last case, twenty years, being given. It is very evident that these have no bearing whatever upon our subject, and there is no reason therefore for founding any treatment on the practice referred to. Mr. Coulson speaks of hemlock in relation to the hypertrophied prostate, and "believes it may prove beneficial in some cases." He "frequently combines it with iodide of potassium,"* which fact certainly cannot be regarded as additional testimony in its favour. The reputed efficacy of this plant in the resolution of enlargements, particularly of the lymphatic and of the mammary glands, seems to rest on good evidence, but I have not yet been able to obtain any proof of its utility for the cases before us, although it may be worthy a trial. One thing is certain, there is no preparation in the materia medica respecting which more care is necessary in order to obtain pure, than the extract of hemlock; and this should never be forgotten when it is intended to employ it. Further, in order to ascertain its real value, it should be always given alone, and for a considerable period of time. The dose is from two to five grains, two or three times a day.

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* On the Venereal Disease. 2nd ed. London, 1788. p. 174.

Mercury has been written about as a remedy, and although never highly recommended, has been spoken of as "worthy of a trial." If there is one agent more than another, for the administration of which no indication in this complaint exists, it is, I should think, mercury. I cannot conceive an elderly patient with hypertrophied prostate being otherwise than injured by a course of this indiscriminately-prescribed drug, and must protest against its admission into a catalogue of medicines, having the slightest claim to influence favourably the disease in question.

The hydrochlorate of ammonia has enjoyed a considerable reputation in Germany since Dr. Fischer of Dresden first claimed for it, in 1821, the power of reducing senile enlargement, when taken in sufficiently large doses. Several have subsequently reported its efficacy; among the most recent of whom is M. Vanoye, who relates two cases in which he employed it successfully.* He commenced by giving, in numerous doses, four grammes (about one drachm), daily, increasing the dose to double, and at last to three times that amount. Larger quantities than this produce unpleasant symptoms. No result was observable until it had been taken four or six weeks; after an interval it was again administered for six or eight weeks longer: the full dose of two to three drachms daily being employed during the greater part of that time.

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* Diseases of the Bladder and Prostate Gland. 4th ed. p. 438.

I believe the remedy has not been tried to any extent in this country. I have heard of small doses being prescribed, but it is necessary to bear in mind that the originators of the plan lay great stress on the necessity for employing the full quantity named above.

Iodine and its combinations have been put in requisition pretty extensively, with a view to the removal of prostatic enlargement, and a considerable degree of success has been claimed as the result. The known power of this substance in effecting the resolution of numerous swellings of the lymphatic glands, of the thyroid gland, and other tumors, naturally induced a trial of it in this affection also. The late Mr. Stafford first called the attention of the profession to it with this view in 1840, and in 1845 published a second edition of his work, giving the result of further experience; and the opinion which he formed therefrom was expressed in the preface in the following terms:—"I have very little hesitation in saying, in the general cases of enlargement we meet with, success will attend the treatment, if it be properly effected and persevered in for a sufficient length of time."*

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* Annales Méd. de la Flandre Occid. April, 1852. From the Bull. Gén. de Thérap. 1852. p. 521.

Mr. Stafford's plan consisted in administering iodine internally by suppositories in the rectum, occasionally by the mouth, and in applying it to the urethral surface of the prostate in the form of a weak ointment; commencing with one grain of the iodide of potassium to the drachm of simple cerate, and increasing it to ten or twenty grains to the drachm, sometimes even adding to this a small quantity of the pure iodine. He states that his success was complete with numerous cases of the complaint in advanced age, as well as in that form to which young men are subject.

On analyzing the cases detailed, twenty-seven in number, eleven only can be regarded as examples of the enlargement of old age, and in these the inference depends on the evidence afforded by the author's examination, by exploration of the rectum. In several of the others, an enlargement confined to the " middle lobe " was diagnosed, because there had been difficulty in introducing an instrument near to the neck of the bladder, no enlargement being presented in the rectum. These, of course, are rejected, first, because existence of the difficulty described is no proof that enlarged " middle lobe " exists; and secondly, because we now know that it is extremely rare to find this form of enlargement unaccompanied by augmentation of the lateral lobes also. In other cases, confirmed stricture was present; when, if difficulty in drawing off the urine was experienced after the catheter had been passed through the contraction, enlargement of the " middle lobe " was in consequence affirmed to exist. But the co-existence of senile enlargement with stricture is not common, while difficulties in traversing the posterior or prostatic part of the urethra after a stricture has been passed, no hypertrophy existing, are familiar to every surgeon of experience from other and well-recognized causes. Lastly, the remaining cases ranged between twenty-one and forty years of age; the affection followed a severe gonorrhæa; and they were examples of enlargement from prostatitis in early life.

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* An Essay on the Treatment of some Affections of the Prostate Gland. By R. A. Stafford. 2nd ed. London, 1845. Preface. p. vii.

But eleven cases of success, in individuals ranging between fifty and eighty years of age, are recorded without hesitation, and must be accepted or rejected according to the view which is taken of the author's powers of diagnosis, and accuracy in reporting. It is almost unnecessary to call to mind the fact, that a very careful and discriminating exercise of both these faculties is necessary in observing the increase or decrease in size of a tumor, the chief evidence respecting which is derived from rectal examination, especially if the progress be slow. The reader cannot, however, but be struck with the ease and confidence with which the author notes the effect of only two or three suppositories, as perceptible to his finger in the diminution of the enlarged prostate; with the general completeness of the cures vouched for, and the rapidity with which they appear to have taken place. From two to four months is affirmed to have sufficed, in several instances, to reduce the prostate of an aged person from "the size of a hen's egg" to its natural dimensions (see page 101 and elsewhere). All that can be said further is, that the success was marvellous, and that other surgeons have been less fortunate, notwithstanding that Mr. Stafford's experience certainly induced numerous trials of his remedies by others. And thus it has come to pass that the use of iodine in these cases has been almost relinquished in practice.

Regarding this substance, nevertheless, as one of the most powerful and useful agents in the materia medica, in accomplishing the removal of enlargement when affecting various organs of the body, a view which is entertained of it by the profession at large, does it not appear to be possible that we may err in pursuing an opposite extreme to the practice just described, and in banishing it altogether from our list of remedial means? With our present views of the disease and knowledge of remedies, there appear to be none which afford so fair a hope of possessing a power to influence it, as iodine, and its congener bromine. Much must depend upon the manner of its administration, which requires the exercise of judgment and watchful care. The influence of these agents over simple enlargements of the uterus is undoubted, and a certain analogy between prostatic and uterine enlargements has already been pointed out (page 40, *et seq.*).

To affirm that there may be good grounds for believing that those remedies which promote absorption or discussion in the former complaint may be similarly effectual in the latter, is only a legitimate inference. The highly-charged iodine and bromine springs of Kreuznach in Rhenish Germany have obtained a deserved celebrity in the uterine cases referred to, as many of the highest authorities in London and Edinburgh testify. A knowledge of this fact, and a hope that some new source of efficient treatment might be found for the prostatic affection also, impelled me to visit Kreuznach rather more than three years ago. And what I then learned still confirmed this hope. Dr. Prieger, the well-known physician there, assured me that in the treatment of the chronic enlargement of the prostate of age, he believed he had seen some valuable results from the employment of the waters by bathing and clysters. Since that time the Kreuznach waters, and their saline constituents, have been imported in different forms, and employed in various complaints in this country, although I do not know that they have been used by any but myself for the disease in question.

Now without hastening to report any great results at present, for there is no one subject more difficult to form accurate opinions respecting, than the effects and actions of medicinal remedies, and none concerning which it is more necessary to be sceptical in regarding evidence, and slow to judge, I do think that there is some ground for anticipating a beneficial result from the plan of using these means, which I have at present adopted, and am about to advise. The difficulty of arriving at exact conclusions is also singularly great in the cases before us, because it is not easy to determine slight changes in the size of the prostate by tactile examination at different periods. None but a considerable and material change can possibly be verified in this, the only completely satisfactory manner we have of observing the effect of an agent in diminishing its volume. The symptoms may greatly improve; the habitually-retained urine may decrease in quantity, the expulsive efforts of the bladder may become more successful, but all this does not prove the specific effect of the remedy in diminishing volume. It affords collateral proof, or presumptive evidence, but the absolute proof of the material fact is difficult to realize accurately for one's self, and still more difficult to communicate to another.

But then it must not be forgotten that the imbedded or isolated tumor of the prostate, like that of the uterus, cannot fairly be regarded as amenable, at all events to any great extent, to the influence of this treatment. I do not know that there is any conclusive proof to be adduced of the disappearance or even of the considerable diminution in volume of such a tumor in either organ, as a result of the action of any medicinal agent whatever. That general hypertrophy may be thus influenced it is not unreasonable to suppose; continuous outgrowths are, probably, less amenable to therapeutic action, although perhaps not to be regarded as so intractable as the isolated tumors just referred to. Although the latter form is common, yet ordinarily there is associated with it more or less of general hypertrophy as well.

I am of opinion, then, that it is certainly worth while to attempt the reduction of enlarged prostate, especially if it be an example which is ascertained to constitute a pretty uniform tumor in the rectum. If the patient enjoys a fair share of health, there is nothing to contra-indicate it; the treatment may be pursued without exhausting the constitution, or deranging the digestive functions.

The plan which I have pursued in a few cases is the following:—

Tepid hip baths, daily, of water to which the bittern or mother-lye, of the Kreuznach springs has been added, in varied proportions, beginning with half a pint, or pound, according to the form in which it is obtained (see note below*),

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* The principal spring at Kreuznach employed for medical purposes is the Elizabeth-Quelle. Its temperature is 54½° Fahr., and it contains about 90 grains of solids in the 16 ounces, with about 5 cubic inches of carbonic acid gas.

The following is one of the most recent analyses, by Bauer:—

Chloride of Sodium	72·92
„ Potassium	0·97
„ Magnesium	0·25
„ Calcium	12·98
Carbonate of Magnesia	1·57
„ Lime	0·27
„ Iron	0·20
Bromide of Sodium	0·30
Minute quantities of Iodine, Manganese, and some earthy bases with chlorine	1·47
	90·93 grs. in 16 ounces.

In this form it is administered internally in small quantities.

But for topical applications, the water of this spring is strengthened in to four gallons of plain water, at a temperature of 90° to 94°, or warmer, if preferred; in this the patient should be seated for twenty minutes every morning.

Local application may be made either by enema or suppository; if by the former method, the following formula may be depended upon as not too irritating to the rectum. It should be retained there as long as the patient can conveniently do so. The best instrument for injecting it is an india-rubber bottle with ivory tube, as the constituents of the Kreuznach water will rapidly injure metallic apparatus.

℞ Potass. iodidi, gr. v.
Kreuznacher Bittern, ʒij
Dec. Hordei vel lini, ℥iij
Misce pro enema, quotidie utendum.

To this a little opium may be added if necessary, in order to enable the bowel to retain it.

saline constituents by the addition of the mother-lye after the elimination of the chloride of sodium at the Salt Works, which exist on a very large scale close by the town, at other saline springs. This mother-lye, of which the specific gravity is between 1·3 and 1·4, contains no less than between 2000 and 3000 grains of solids in 16 ounces. A late analysis gave the following result.

In 16 ounces of the mother-lye there were 2484·16 grains of salts, constituting about a third part of the mixture.

Chloride of Calcium	1789·97
„ Sodium	226 37
„ Potassium	168·31
„ Magnesium	230·81
„ Aluminium	1·56
„ Lithium	7·95
Bromide of Sodium	59·14
Iodide of Sodium.	0·05
	2484·16 grains.

This fluid being evaporated, the saline matters have for some time past been imported to this country for medicinal use; but the result is considered somewhat inferior as a therapeutic agent both here and at Kreuznach, to the original mother-lye, while it is certainly somewhat less convenient for use. More recently this has been imported by Messrs. Schacht, of 38, Houndsditch; from whom my patients have obtained it in any quantity required, at a very reasonable rate.

The suppository, which, on the whole, is perhaps more easily administered and borne than the enema, may be used after the following form:—

℞ Potass. iodidi, gr. ii.—v.
vel
Potass. iodidi.
Potass. bromidi, ā ā, gr. ii.—iii.
Cerati, gr. viii.
Misce, fiat suppositorium.

This should be employed at the time of going to bed, and may be repeated every night for a considerable period.

The Kreuznach water itself, from the Elizabeth-Quelle, is now obtainable in this country, but is probably less useful than the bromide and iodide of potassium, given internally. I must confess I am disposed to believe less in the value of internal remedies than in that of the topical means described. At most, I would employ only small doses of the bromide and iodide of potassium conjoined, in some suitable vehicle; these are more likely to be useful, and are much better borne by the stomach than the natural water, with its large proportion of chloride of sodium. From three up to ten grains of the bromide with, at most, one of the iodide, twice a day, is the quantity I have employed. It is scarcely necessary to say that this course must be persevered in for a considerable period of time, during which the dose may be gradually increased.

Of the application of these irritants in any form or degree to the surface of the sensitive mucous membrane of the urethra I wholly disapprove. Nothing is easier than to pass down to the prostatic part a small portion of ointment impregnated with some chemical agent, and project it into the urethra there. But that it can remain there in any quantity, or for any time, adequate to the absorption of a part of the salt introduced, I do not believe: the greater part, if not the whole, is speedily removed to the bladder, and the utmost which can be expected to result is an amount of irritation corresponding to the quantity of the agent employed, an effect which, in any degree, is positively injurious.

Now, although I think we may by perseverance in this line of treatment, aided by those other appliances, and by an appropriate regimen, which are necessary, and have been already described, attain some improvement in the condition of the prostate, or, perhaps, be able to retard its increase, I do not think we are warranted in expecting to reduce the bulk of a considerably-enlarged prostate of long standing by the means described. They are, however, simple, easily employed, and unattended with any danger to the patient: and they certainly hold out more promise than any other therapeutic agents with which we are acquainted. They can be tried by the patient himself for a considerable period of time (and without perseverance for some few months it would not be desirable to commence their use), with but the occasional superintendence of his medical attendant, when once instructed at the outset. All the advantages which the natural springs possess are now attainable at home, since the treatment, mainly consisting as it does of external applications, is pursued with precisely the same elements as at Kreuznach, in no respect altered by their transmission here; while for internal remedies, the artificial product of the chemist is preferable to the crude salt water of the native springs.

Under these circumstances I am induced to conclude that we shall act judiciously in advising most patients whose health is good, and in whom the complaint is not considerably advanced, to make trial of the treatment in question.

COMPRESSION.—The influence of compression in retard-ing the progress of morbid growths and enlargements has long been recognized, and is constantly employed with success. Thus tumors have been discussed, and inflammatory products are absorbed, of which instances are familiar to all. The question has therefore arisen, can reduction of the enlarged prostate be effected by the same agency? Its solution has been attempted in various ways, but never, it would seem, with any great degree of success, the practical application of adequate pressure having been generally found either impracticable, or, which amounts almost to the same thing, excessively difficult. It has been supposed, moreover, that the benefit accruing from the use of large catheters in this complaint is in part due to the compression which they exercise on the prostate; and there is probably some amount of beneficial influence thus exerted. It does not appear, however, to act to an extent sufficient to retard development appreciably, although it doubtless tends to maintain a more patent state of urethra than would otherwise be found. It is evident that a much more powerful act of compression, than that which can be exercised by a catheter even of the largest size, is required, if any result is to be anticipated in the way of reducing the size of the organ, or of rendering more patent the partially-obstructed neck of the bladder.

Physick, the American surgeon, attempted to accomplish this object by distending with fluid a small bag of gold-beater's skin, previously rolled up and introduced on the end of a catheter, into the bladder; and by then attempting to withdraw the dilated sac through or into the vesical orifice; and a successful result is reported by Parrish.* Subsequently, M. Leroy D'Etiolles attempted by means of metallic instruments to compress the posterior border of the neck of the bladder. He first of all employed straight, or nearly straight, sounds, by means of which, when carried into the bladder, it is not difficult, as may be readily understood, to make pressure with the hand, after a somewhat rude fashion, directly upon the floor of the vesical neck. As a modification of this method, and owing to the difficulty of introducing straight instruments into the bladder when the prostate is enlarged, he devised an instrument having the form of an ordinary prostatic catheter, the curved portion of which could be rendered straight at will, after its introduction into the bladder, by means of a stilet made of articulated portions capable of being brought into a right line through the agency of a screw in the handle of the instrument; and in this manner he succeeded in exerting a certain degree of pressure on the same limited portion of the organ.* After this M. Leroy proposed to dilate the vesical neck more equably in various directions, by employing an instrument with three expanding metal blades, and again also with the lithotrite of that period (1831-2). Other French surgeons have proposed to introduce a large curved gum elastic catheter, and afterwards to forcibly straighten it by introducing a strong straight stilet. Mercier speaks of having employed this method, and states that a flexible extremity to the steel stilet enables it more easily to traverse the catheter. But he also has devised a special instrument for dilating the prostatic portion of the urethra, or the neck of the bladder. It possesses the form of his catheter with two angles, "bicoudée" (fig. 15 *f*, page 169), but so contrived that pressure in an antero-posterior direction can be exerted by means of a second portion, which, being glided along the shaft, and continuing its direction, furnishes two divergent blades, by which forcible dilatation can be made.* It is stated that he has obtained good results from its employment. Some other apparatus has also been designed in France, but of so complicated a nature, and so obviously inefficient for any practical purpose, that no description need be given in these pages. The foregoing attempts are only detailed here for the sake of illustrating the views which have at different times been held by various surgeons with regard to compression as a therapeutical agent in enlarged prostate, as well as the means which have been employed in order to accomplish it.

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* Surgical Observations. p. 258.

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* Exposé des Procédés pour Guérir de la Pierre. Paris, 1825. p. 180, *et seq.* Par Dr. Leroy D'Etiolles.

Provided that, without difficulty or danger to the patient, an efficient degree of compression could be applied with ease and certainty to the prostate and neck of the bladder, I think it is reasonable to suppose that considerable benefit might accrue from its application. Cherishing this belief I have been long engaged in endeavouring to provide some means of accomplishing this object. The employment of metal expanders, or of metallic instruments of any kind, for the purpose of making forcible and partial pressure in the situation named, I cannot imagine to be otherwise than useless or dangerous. The firm pressure of a catheter, or an opening of any instrument resembling a lithotrite, so as to dilate forcibly the neck of the bladder, must surely be—indeed we know by experience that it certainly is—productive of more or less of inflammation, or at least of vascular disturbance in the parts, infinitely more likely to do harm than good to a patient with enlarged prostate. Slight liberties of this kind occasion an increase of congestion, a state of matters always to be avoided, unless counterbalanced by the attainment of some undoubted and considerable benefit. It occurred to me that if compression were to be serviceable at all, it would be best employed through the medium of india-rubber tubing, supposing that we possessed the means of expanding any given limited portion of the tube gradually and with ease, and of effecting this with such a measure of certainty and accuracy as respects situation and extent of dilatation, as should render it impossible to be deceived, and so led to perform less or more than we intended. This after several trials I have completely accomplished, and now possess an instrument which combines extreme simplicity in construction, capability of being applied and adjusted with ease, and accuracy of performance. It consists of an ordinary metallic catheter, which may be of any form or size required, with a stopcock at the handle, and a syringe containing air or water, which fits accurately to the mouth of the catheter. A tube of prepared india-rubber, measuring about five or six inches in length, is closely drawn over the entire instrument, and fastened by a thread of silk close to the handle. On applying the syringe previously filled with water, and making pressure, the fluid passes through the eyes of the catheter, the lower three inches of the india-rubber tube become very gradually distended, *equally in every direction*, until the diameter reaches to the half, or three quarters of an inch, or even to almost double this extent if required. Water is a better agent than air for the purpose, and is preferable to any other fluid, as being perfectly clean and easily removed afterwards. The entire diameter of the instrument in any of its parts before expansion does not exceed No. 9 or 10 of the ordinary scale—the form of the expanded portion is, in some degree, that of a spindle when considerable distending force is employed; the maximum of diameter being at the centre, the size gradually diminishing before and behind. The expanded portion may be made either more spheroidal or more oblong in form, by a very slight adjustment of the tube. The more tightly this is drawn over the catheter the longer will be the expanded portion, and *vice versâ*. Fig. 14, *a* and *b*, will show the instrument in its two conditions, viz. before and after expansion.

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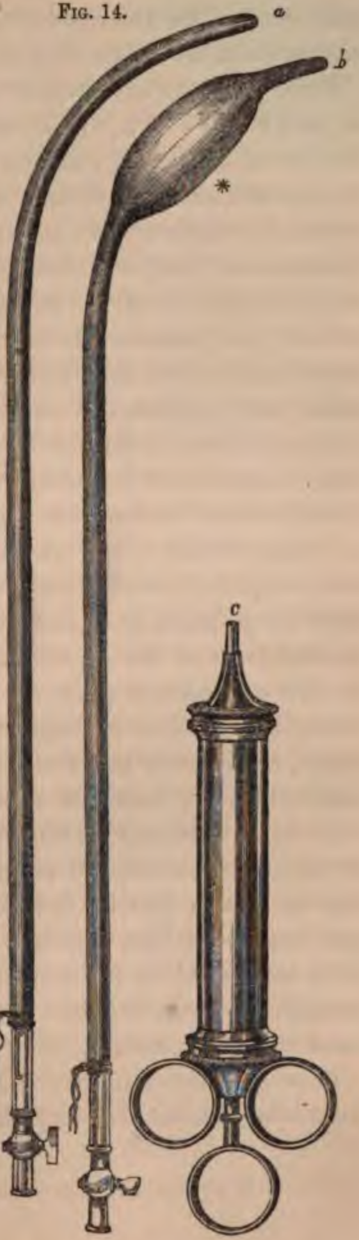
* Recherches, &c. 1856. pp. 174, 175.

I have employed a principle in the construction of this instrument which has long ago been resorted to for the dilatation of canals in various parts of the body. The Egyptians and Arabians, between two and three centuries ago, were accustomed to facilitate the passage of small calculi through the urethra by dilating it, with the aid of membranous tubes distended with air or water.* About a hundred and thirty years ago the application of dilatation of the prostatic parts of the urethra through a peri-

Fig. 14.



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* *Vide* Prosper Alpinus, De Med. Ægyptiorum. Lib. iii. cap. 14. p. 104. Parisiis, 1645. Also, Octavius Roferetus, *vide* Institut. Chir. By Johannes Jessenius. Cap. xvii. p. 84. Witebergæ, 1601.

neal opening, for the removal of calculus from the bladder, was proposed by means of sponge and gentian tents.*

Since the time of Physick, who employed the apparatus of goldbeater's skin, as already referred to, Dr. James Arnott has advocated a similar proceeding for strictures of the urethra, and has detailed cases in which he has so employed it. He has also suggested its application to various therapeutical purposes, naming a variety of conditions in which it might be useful, and among them chronic enlargement of the prostate. In strictures of the narrowest kind, those indeed which chiefly offer much difficulty in the treatment, such apparatus is obviously inapplicable, since the smallest catheter which can be constructed is sometimes too large to enter; but in prostatic enlargement, when the canal already admits instruments of the largest size, the principle of eccentric dilatation or expansion, is manifestly the most safe, complete, and efficient method of employing pressure upon the prostate, or of attempting to open out the neck of the bladder, and the superiority which it possesses to any metallic expanders requires no argument for its demonstration. The manner of employing my instrument is very simple, and scarcely requires explanation. The only point about which any hesitation or difficulty may be experienced is not in its management, but in the previous determination of the precise situation of the prostate, so that the operator may be certain that he is making dilatation in the exact spot required. This difficulty will not be felt by any one much habituated to the employment of instruments in the urethra. Perhaps the best method to adopt, in order to make the effect certain, is as follows.

First introduce into the bladder an ordinary catheter; it is desirable, but not necessary, that the curve should resemble that of the dilating instrument to be subsequently employed; the catheter should have but one eye, or opening, near to its extremity, and should be graduated, in inches, the measurement, however, commencing at the eye, and not at the beak of the instrument. While the urine is flowing through the catheter, it should be gently drawn out, so as to cause the current momentarily to cease, and the mark upon it which is at that instant opposite the external meatus, and which will therefore indicate the exact length of the urethra, should be carefully noted. It may now be pushed in again, and the process repeated, if necessary, to check the first observation. Having thus obtained the exact length of the patient's urethra, the same number of inches should be measured upon the dilating instrument from the distal limit of the expanding part, along the shaft, and a small piece of thread should be firmly tied to the latter point as an indicator; the india-rubber tubing being best marked in that way, not being easily susceptible, like metal, of permanent graduation. If this instrument, therefore, be passed into the urethra so far that the thread corresponds with the external meatus, we know that the expansible part now lies exactly in the prostatic urethra, and if it be desired to dilate there, we have only to apply the syringe (fig. 14, *c*), and make pressure slowly and deliberately upon the piston, regulating it according to the sensations of the patient. The instrument is so adjusted that one movement of the piston rod through its entire length is equal to producing complete expansion of the india-rubber tube within perfectly safe limits, that is to say, such is the ordinary charge, although more may be sustained with safety; as is previously proved by the maker, who guarantees it to bear pressure up to one and a half, or even to two syringes; but the dilatation produced by one syringe is the maximum required, or intended to be used. It may be as well to add that if the india-rubber were to give way and collapse, and the water escape from undue dilatation, no pain or harm of any kind would result. At the first sitting the third or the half of a syringe is as much as will probably be borne, and it should be a rule not to cause pain, or, at all events, more than a slight and very tolerable amount of uneasiness, which, by the way, I have rarely found produced even by considerable dilatation. Following this rule it is impossible to do mischief. Supposing it is desired, as it probably often will be, that the dilatation should be applied a little further back, that is, to the posterior half of the prostatic urethra, and to the neck of the bladder at the same time, we have only to push the instrument about half an inch further in than the point marked by the thread, and to dilate forthwith. The stopcock at the end of the catheter should immediately be turned to prevent any reflux or escape, when we cease to make pressure on the piston-rod. The instrument can then remain *in situ* for a few minutes. Before removing it the stopcock must be turned, so that the water escapes from the distended portion.

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* By John Douglas. Phil. Trans., 1727. p. 318.

I have stated that it is necessary to draw off the urine from the bladder before employing the dilator. The object, as has been explained, is simply to determine the length of the urethra. It sometimes happens that the dilatation is best effected when some urine is left in the bladder, indeed generally it seems to answer better when this is not quite empty. Consequently, we may either attain our purpose without removing the whole vesical contents, or, if we have done so, we may throw in a syringe-full of water through the catheter before withdrawing it. It is scarcely necessary to add that this, as well as that used for injecting the dilating instrument, should have a temperature of about [illegible]

Rega[illegible] of time during [illegible]

[illegible]

feelings of his patient. At first from one or two to five minutes is sufficient. As he proceeds this term may be extended until it reaches fifteen or even twenty minutes. Longer than this I have not employed, nor would advise it. Indeed I am not aware that anything is gained by extending the period beyond five minutes. The frequency of the application must also be determined in the same manner. I have never, in any of these cases, encountered difficulty by proceeding cautiously at first, and can only advise that a similar principle of action be always maintained. Every third or alternate day, at first, afterwards every day, but not more frequently than that, it may be used. After its first application the patient may be placed in a hot hip bath for a few minutes as a precautionary measure; one, however, that will probably not require to be repeated. After three or four applications the patient will probably observe a notable improvement in the stream of water, and if he has been habitually retaining it, will very likely find the residual urine diminishing.

The india-rubber tube described may be supplied to fit any catheter, and be employed without any difficulty, provided that the instrument is of the requisite length, and is properly fitted to a syringe.

Division of the obstructing portion at the neck of the bladder has been performed. Other operations have been also attempted for effecting a similar purpose, such as the excision or the crushing of a protruding portion; and even the ligaturing of a polypoid outgrowth. Respecting the division of an obstruction, bar-like in its form, elevated from the posterior border of the neck of the bladder, it is no doubt a proceeding to be accomplished without much difficulty, with the exercise of ordinary care. In most cases, although not invariably, the bar is a prostatic development, and when well marked may perhaps in some cases be incised with advantage, and without danger to the patient. Such was the opinion of the late Mr. Guthrie. As, however, he introduced the consideration of this subject to the profession in connection with his views of another affection occasionally met with, altogether distinct from enlarged prostate, and to which he gave the name of "bar at the neck of the bladder," I shall defer any further remarks respecting the operative proceedings (which must be the same, or nearly so, whatever be the constitution of the obstruction in question) to the twelfth chapter, which is devoted to an examination of that subject. In that place the various cutting operations which have been applied to the prostate will be considered at length. A very few words will suffice for the notice of crushing and the ligature. Some of our French brethren have performed on the living body these procedures, the first named not unfrequently. A portion, supposed tc be the protruding one, is seized between the blades of a lithotomy forceps, or an instrument very similar, and is torn away, if possible, or crushed, so as to ensure a state of sphacelus in the part attacked. Jacobson's lithotrite has been also used, and is preferred for the purpose.* M. Leroy has also described an ingeniously-contrived apparatus for applying a ligature to the base of a polypoid tumor, springing from the posterior median portion of the prostate. It is engraved in a late work, where he states also that he has used it with success.† No details of the operation are given, although, it must be confessed, they would have been exceedingly interesting, both in respect to the difficulties overcome, and the subsequent effect of leaving a putrid slough in the bladder, as a result of the process. Very recently, the same surgeon has designed an ecraseur, contained in a canula of the form of a catheter, for the purpose of removing these outgrowths.*

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* The mode in which M. Leroy adapts the instrument of Jacobson to the purpose is explained and illustrated by a drawing in the Gaz. des Hopitaux, January 27, 1849.

† Thérapeutique des Rétrécissements, des Engorgements de la Prostate, &c. Paris, 1849. pp. 75 and 77.

In estimating these proposals, I think most English surgeons will be content with awaiting further experiences in the hands of those who have hitherto seen fit to adopt them. For my own part, I have no expectation that any benefit will be conferred on the patient by such methods of accomplishing the ends proposed, even granting that no doubt existed as to the possibility of carrying them into execution. Mention is made of them here, solely because there exists no good reason for ignoring the practice which is followed by well-known surgeons in the great continental capital. Let it, however, by no means be supposed that such mention implies approval.

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* Bull. de la Soc. Anat. Paris, 1856. p. 420.

CHAPTER VIII.

THE TREATMENT OF RETENTION OF URINE FROM ENLARGED PROSTATE.

Urinary Retention from Enlarged Prostate, generally due to Congestion of the Organ; first indication, to relieve Congestion—Baths; second, to allay Pain and Spasm—Opium; third, instrumental relief—Catheters, various.—Comparative Advantages of.—Modes of passing solid, flexible, &c.—Mercier's Instrument; Mode of passing.—Should the Bladder be emptied at once?—Should the Catheter be retained?—Catheterism unsuccessful,what Means are to be employed?—Perforation of Prostate.—Puncture of Bladder above Pubes; by Rectum; through Symphisis Pubis.—Comparative Merits of.—Case.—Perforator.—Perineal Operation.—Conclusions.

It has been already premised that the term complete retention of urine, here used, does not include or designate that chronic retention of urine so frequently present as a result of enlarged prostate, and so familiarly known; but is intended to apply alone to that urgent condition in which, from this cause, the patient is unable to pass any urine at all, or, at all events, only in quantity so small, as not to equal the amount of excretion naturally produced; a condition in which he is therefore in a state of hourly-increasing difficulty and danger, and from which it is not merely expedient, but necessary, in order to save his life, that he should be relieved.

Some external circumstances generally give rise to that exacerbation of the habitual symptoms which constitutes the state in question. In by far the greater number of cases, exposure of the surface of the body to cold or wet, or to both combined, is the agent, which, augmenting the distribution of blood to internal organs, produces congestion in the already-enlarged prostate, and an engorgement of its vessels, which temporarily increasing its volume, occludes the already narrowed urethro-vesical orifice. Whatever the cause, however, by which prostatic congestion is thus suddenly favoured, this is, in almost all instances, the essential nature of the obstruction. Hence may be inferred the first indication by which to direct our treatment, viz. to overcome or dissipate as much as possible internal congestion. The second is to allay pain, and quiet those involuntary but unavailing efforts to pass water, which the patient almost invariably suffers from to a distressing extent; and thirdly, and mainly, to give exit to the urine, and unless in very exceptional cases, by the natural passage of the urethra.

We shall fulfil the first indication in the most efficient manner, by employing the hot bath for the whole body. This may always be ordered with advantage, unless the presence of the surgeon is required at a very late period in the course of affairs. It sometimes is alone successful, and if so, ensures the desired end with the smallest amount of suffering or risk. If not, it at least places the parts in a better condition for the subsequent use of the catheter. The temperature should be high, from 100° to 104°. Patients who have resorted to it frequently require a much higher degree of heat than those who are not so accustomed; and the duration of the bath may be about fifteen or twenty minutes, the heat being rather increased than diminished during that time. Before the first-named period has elapsed, it is more than probable that a full effect will have been produced on the skin, that its vessels are filled, and a considerable derivation from the internal viscera must have been accomplished. Supposing, then, that the patient has not been able to relieve himself freely by this time, and is not unduly faint, an attempt may be made at once, while he is still in the bath, to introduce a catheter. If, on the other hand, he is becoming faint, and this is more likely than otherwise to happen in patients more or less advanced in years, as the subjects of these attacks always are, it will be better to wrap him in warm blankets and move him at once to bed, before taking the next step to give effectual relief to the bladder. Meantime, however, if there be signs of much suffering, and it is almost certain that such will be the case, and particularly if involuntary paroxysms of straining to pass urine are present and uncontrollable; some sedative should be freely administered. Opium is one of the best; and no better form need be desired for the purpose, than the "liquor opii sedativus," of which thirty to fifty minims may be given, according to the judgment of the medical attendant.

With the third and last indication comes the question of the catheter; not a question as to the propriety of using it forthwith, or of delaying; for of the former course there can be no question, but that of the kind of instrument to be employed, and of the best manner of overcoming the varied difficulties which may present. Let me premise, then, that with the exercise of great care, and of ordinary skill and judgment, there should rarely, very rarely indeed, be failure in the attempt to reach the bladder and remove its contents, by introducing an instrument safely through the track of the urethral canal. There are certain circumstances under which this accomplishment would be impossible, but such are fortunately of very unfrequent occurrence. The surgeon should be provided with silver and gum elastic catheters of the ordinary prostatic length and curves. First,

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EXPLANATION OF FIG. 15.

a Prostatic Catheter, No. 1, adapted for most ordinary cases.

b Prostatic Catheter, No. 2, the curve and size usually sold by instrument makers as that of Sir B. Brodie.

c Prostatic Catheter, No. 3, the largest size, the curve commonly called "Liston's."

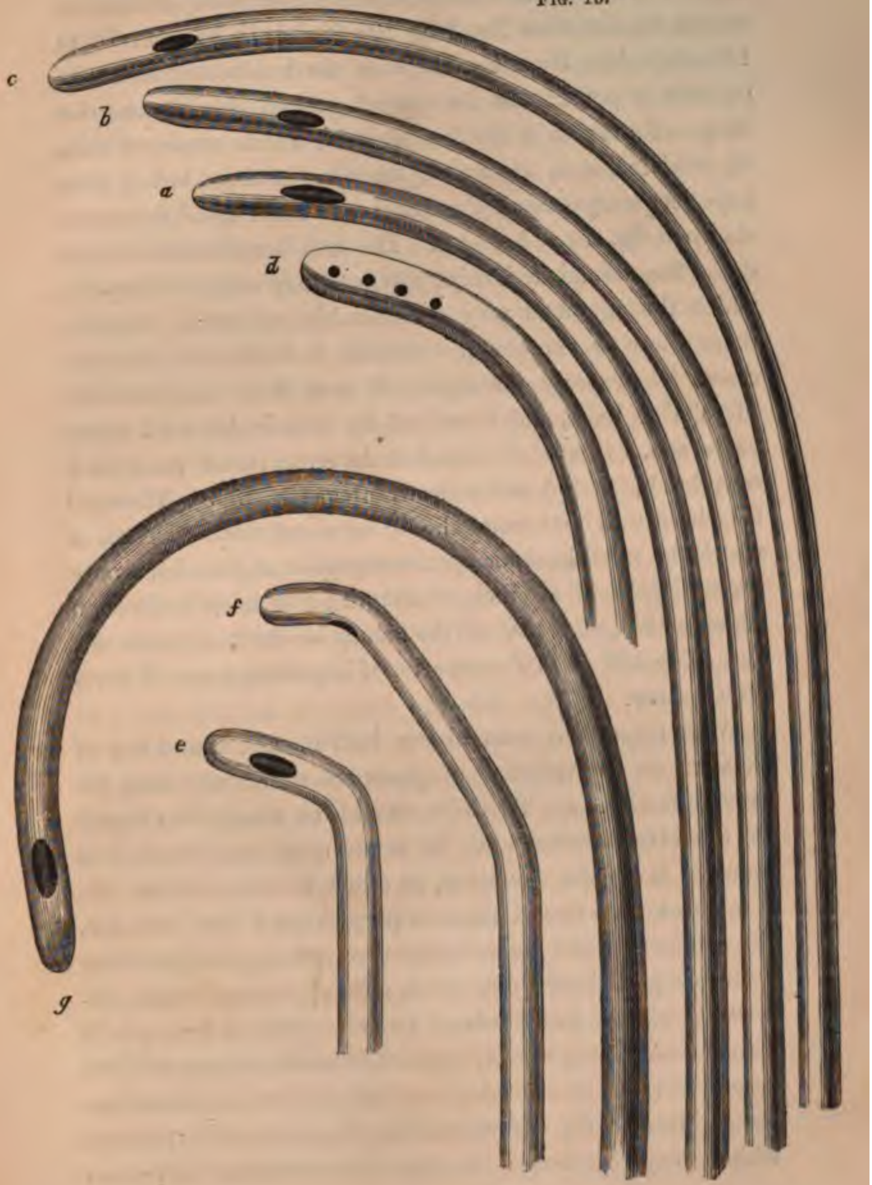
d A Prostatic Catheter strongly recommended by the late Mr. Guthrie. "This particular curvature I obtained after many trials with a flexible metallic instrument, and I believe it to be the best."—*Anat. and Dis. of Urinary Organs.* 3rd ed. p. 34.

e The Prostatic Catheter of Mercier—"sonde coudée."

f Another, recommended in some cases of difficulty—"sonde bicoudée."

g An Elastic Gum Catheter, mounted on an over-curved iron stilet, for the purpose of ensuring a suitable curve in the instrument after the stilet is withdrawn.

FIG. 15.



respecting silver instruments, a prostate-catheter should not be less in size than No. 9 or 10; it should be from 12 to 14 inches long from the rings on the handle to the end of its beak or point; and the curved portion should comprise about a fourth to a third of a circle, which measures from 4½ to 5½ inches in diameter; the mean of these being, perhaps, the most generally useful size. Three good forms are shown at fig. 15, *a*, *b*, and *c*. The first is sufficient for most cases, the second and third are necessary only for those in which the organ is very considerably enlarged. Besides these there is another instrument, a useful one in some cases, if properly managed. It was first suggested by Mercier of Paris, and described by him in his work many years ago. I have employed it in exceptional cases for a considerable period, and with advantage (fig. 15, *e*). The total length of this instrument should be about twelve inches, of which the small beak, or upturned portion at the end, is only seven-eighths of an inch in length; this takes a direction which makes, with that of the handle or shaft, an angle not exceeding 100° or 110°—a matter of importance, as will hereafter appear.

With respect to gum elastic instruments, almost any of those made for ordinary purposes are sufficiently long for prostate-catheters. The size should be about that named for the silver instruments. It is advantageous, indeed it is more, it is almost necessary, in order to render them efficient, to keep a few of these in preparation; that is to say, the catheter should be maintained constantly, during a considerable period of time, on a strongly-curved stilet, describing almost two-thirds of a small circle, a curve, it is almost unnecessary to add, in which it would be impossible to employ it; but on removing the stilet from one which has been so treated for a few months, we possess an instrument which may be found in some circumstances to possess qualifications of extreme utility (fig. 15, *g*). The value of this method arises, in great measure, from its ensuring that the beak, or last inch or two of the catheter, is sufficiently curved. However well curved the rest of the instrument may be, if the last inch be straight, it will, almost to a certainty, become engaged in the prostate, and will not pass over an enlarged median portion. This should never be forgotten in giving the intended curve to the iron stilet, which cannot be done with the fingers; the last inch can be well curved only with a pair of pliers. A gum catheter also may be used, either with or without a stilet; in one case being a flexible, in the other an inflexible instrument; so that it possesses sometimes an advantage over metallic instruments in its capability of being adapted in form to any curve which the peculiarity of the case may appear to demand.

It will, I think, answer no practical end to refer to the usage and recommendations of acknowledged authorities on the debatable point as to whether the flexible or the metallic instrument is to be preferred in catheterism for retention from enlarged prostate. We should, by doing so, but place in juxta-position the most opposite opinions and practice, and that from men of large experience and sound judgment. By some the silver catheter is exclusively used; others believe the elastic instrument infinitely superior. Now, although for cases of stricture of the urethra I advocate the use of inflexible instruments as the rule beyond all question, and one which admits of very few exceptions (a subject fully discussed in my work on that subject), I have as little hesitation in regarding the two varieties as possessed of almost equal utility in cases of prostatic disease. And there is nothing paradoxical in this. The object in stricture is to introduce an instrument of small size into a narrow opening, situated usually in the *straight part of the canal*, or, more accurately speaking, in that part of the canal which has little or no natural curve, and which is maintained almost as readily in the straight as in any other direction. The direction in which the catheter is employed may be completely determined by the operator, and his success depends much upon the control which he exercises over it. But in prostatic enlargement the case is different; the ability to determine the precise direction of the catheter, although considerable, is less complete. First of all, the obstruction is situated in or beyond that part of the canal which naturally possesses a curve; secondly, the curve is liable to be indefinitely increased by the presence of the disease in question; and thirdly, the canal may deviate irregularly either to right or left, as an effect of the same condition. Under these circumstances, while confessing at the same time a natural predilection to a silver catheter, as generally a more certain and satisfactory instrument, I nevertheless have met with cases in which the gum elastic catheter has proved the most successful instrument, and has been productive of less pain to the patient. We may consider instruments of both kinds necessary to a properly-furnished armamentarium to meet the emergencies under consideration.

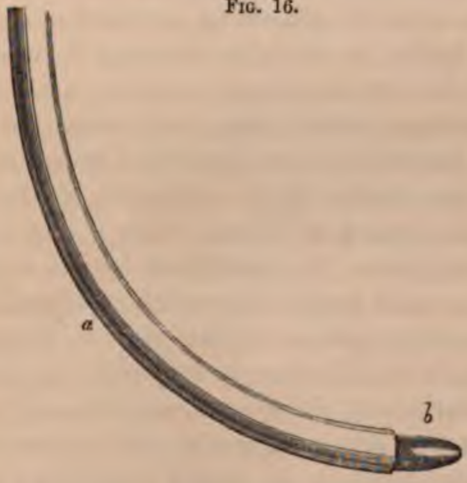
It will be easily inferred from the foregoing that I prefer, as a rule, to use a well-oiled and warmed silver catheter at the outset; it furnishes us with more certain means of making correct diagnosis as to the precise situation of the obstruction, can be better felt through the perineum or from the rectum, and can better reveal the condition of the canal to an experienced hand than the flexible instrument. In very many cases it will enable us to afford relief to the patient "cito, tuto, et jucunde." As it is desirable to follow a uniform manner in introducing it, and to adopt one of the best, I may describe the following as one which has received the sanction of the most facile masters of the art, both in this country and abroad. The surgeon, standing at the left side of his patient's bed, who should lie on his back in an easy position, takes the catheter lightly between the thumb and fore and middle finger of his right hand, which occupies the supine position, the former (the thumb) being, therefore, applied to the upper surface of the handle, close to the rings; the two latter supporting it below, and in a horizontal direction. The penis may be either held indifferently between the thumb and fingers of the left hand, or uniformly according to the following method, which is not without a certain convenience. The left hand is in this case applied, the palm being upwards, so that the middle and ring fingers hold the penis just behind the corona glandis; the index finger and thumb are then at liberty to be applied for the purpose of retracting the prepuce if necessary. The point is then introduced into the urethra, the direction of the shaft being parallel with the line of the left groin, and the instrument carried down as far as it will go without elevating the handle from the horizontal line. This is now gently carried to the median line of the body, and at the same time a little raised, so that the point traverses the sub-pubic curve. The penis being now untouched, the shaft of the catheter is brought to the perpendicular, and moved slowly downwards towards the interval between the patient's thighs, while at the same time slight traction is made upon it, so as to keep the beak of the instrument closely along the roof of the urethra and enable it to slide closely under the pubic arch; after which, unless the obstruction be considerable, it will soon enter the bladder, gliding over any little prominence of the floor of the vesical neck. Supposing that the difficulty is not overcome by this simple means, there remain but two modes of manœuvring which afford a reasonable chance of success with the silver instrument of the ordinary prostatic curve. The first is the attempt to follow more closely, or accurately, the upper aspect, or roof, of the urethra, either by withdrawing and sooner depressing the handle, or by employing an instrument with a longer and more strongly-curved extremity, so as to override, if possible, a large tumor of the median portion, or other prominence of that part. The second is to incline the beak, when arrived at the prostate, either to the right or left, so as to pass through the sinus or hollow which, to a greater or less extent, exists on each side of such median projection, entering the bladder not over, but laterally, as regards the obstruction. These are the points which experience, as well as our knowledge of the pathological anatomy of the organ, indicate to be borne in mind.

Failing in attempts by this manner, a gum elastic instrument, which has been kept for some time on the well-curved stilet, as before described, should be well oiled, not warmed, as this will destroy or weaken the curve, and then removed from the stilet immediately before it is required to be introduced. This is slowly carried down the canal, the pendant part of the penis being drawn over the left thigh or groin, and accommodated to the curve of the instrument, so as not to unbend the latter more than is necessary; and the general direction already indicated in the directions given for the use of the silver catheter are to be followed for the remainder of its course. Owing to its flexibility and a well-curved point, it not unfrequently glides in without a hitch; but if it be otherwise, the lateral direction of its point may be varied, by twisting the handle slightly to either side. By withdrawing and again pushing forwards, by communicating a little screwing motion as it is thus made to advance, by making pressure on its convexity with the point of the index finger on the perineum, or placed within the rectum for that purpose, or by pressing closely on the root of the penis in front, it is probable that the end will be attained.

The use of the stilet is twofold. First, if the silver instruments are insufficiently curved, we possess the means of employing an inflexible instrument, although constructed of gum, of any curve we desire, by first communicating it to the stilet, which ought to be stouter and stronger than a mere wire. Secondly, it enables us to put in practice a manœuvre of considerable utility, well known as having been originated by the late William Hey, of Leeds. Many have derived an advantage from adopting it in circumstances of difficulty. It may be thus described: the catheter, mounted on its stilet, having been introduced as far as to the obstacle, the stilet is then withdrawn about an inch, which has the effect of increasing the curve and elevating the point of the catheter, so as often to carry it over the enlarged portion in a manner less easily accomplished in any other way.*

Another method, which has occurred to myself, is to employ a full-sized silver catheter (No. 10 or 11) of the number one prostatic curve (fig. 16, *a*), but completely open at its

FIG. 16.



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* Pract. Obs. in Surgery. By Wm. Hey, F.R.S. Lond., 1814. 3rd ed. pp. 399, 400.

extremity, as if the point were cut off. A flexible gum elastic catheter, of a size adapted to fill pretty accurately the channel of the silver catheter, is to be passed through this, just so far that the point of the flexible instrument protrudes, forming an obturator and point (*b*), this apparatus being passed down to the obstruction, and the silver catheter being held by the left hand, the flexible one may be gently pushed onwards through the former, and may find its way into the bladder, when neither the silver nor the flexible instrument would pass alone.

In employing any manipulation hitherto mentioned, the instrument should be held with extreme lightness, and used only with gentleness and delicacy. By no other means can the operator learn to appreciate the kind of resistance which its point encounters; by the gum elastic instrument especially he may be easily deceived if he uses an improper degree of pressure, which, instead of advancing, is, perhaps, merely driving it into some lacuna, or against some fold of mucous membrane, while the instrument, nevertheless, continues to disappear under the hand, by becoming bent within the urethra. No practised hand, however, can mistake the sense of resistance offered under these circumstances; nevertheless, it has ofttimes been a source of deception, and frequently has resulted in the laceration of the passage. It is a trite remark of Civiale that, "a catheter goes properly only when it is *swallowed* by the urethra; no quicker or more forcible movement is *allowable* there." There is a truth conveyed by this remarkably appropriate simile, which should never be forgotten; the instrument should travel through the delicate, sensitive, and contracted mucous canal by a slow, continuous, and easy movement, resembling that by which the morsel travels from the fauces to the stomach. Anything more forcible, more rapid, does but excite resistance, either of a mechanical or vital nature;

if, in the former case, by carrying before the point of the instrument a fold of mucous membrane; or if in the latter, by exciting either voluntary or involuntary contraction of some of the muscular structures around.

Sir B. Brodie recommends, in cases where "the urethra is irritable and liable to spasm at the membranous part," that the gum catheter should be passed to the neck of the bladder without a stilet, after which this may be introduced in order to enable the operator to surmount the obstruction there. Less opposition is encountered, he believes, by the instrument when flexible than when made rigid by the stilet.*

The method of employing the angular instrument of Mercier comes next to be described. It is not to be passed in the manner of the ordinary catheter, nor even exactly as the lithotrite, the form of which it strictly resembles. Success in its use in difficult cases depends upon the management of it after a particular method, otherwise no advantages can arise from its employment.

The idea of an instrument with a beak nearly at right angles with the shaft, and not more than three-fourths or seven-eighths of an inch in length, takes its origin from the peculiar form and size of the urethra, known to be assumed in largely-developed swelling of the lateral lobes of the prostate. As has been shown in the chapter relating to the pathological anatomy of the organ, the urethra within the prostate becomes increased considerably in measurement from its floor to its roof, and the opening into the bladder elongated vertically, so that the canal forms a long oval in its recto-pubic diameter, instead of a spheroidal section, when distended by an instrument; at the same time a sudden elevation generally exists on the floor at the vesical neck, a kind of elevated step at the entrance to the bladder. Now, then, the adaptation of the instrument to the formation described will be seen. The following manner of using it, in order to carry out the idea suggested by the morbid anatomical condition referred to, is derived from Mercier, its originator, although not given here precisely in his own words. The operator stands indifferently on the right or left side of the patient, who is lying on a couch or bed; the right being more convenient at the last step of the process, in which position we will therefore now consider him. Taking the penis in his left hand, and holding the catheter in his right, he introduces it in the ordinary manner as far as to the bulbous portion of the urethra, when the shaft is to be raised nearly to a right angle with the patient's body; it is not now to be simply depressed between the patient's thighs, as this would merely tilt up the beak against the roof of the urethra, and not cause its advance along the canal, as in the case of the curved catheter; but there is to be a combination of the two actions of pressing in the line of the shaft and depressing, the degree of the latter to be regulated according to the advance which the beak is felt to be making as it glides through the deep portions of the urethra to the prostate. Thus far we have introduced it precisely according to the mode in which we should pass an ordinary lithotrite. But if there is obstruction of the kind now under consideration, as soon as the instrument has obviously arrived at it, and will not advance further by the means directed, its shaft is to be depressed until it nearly reaches the horizontal line of the body along the interval between the thighs, in which direction it is to be gently pressed forward, so that the whole of its short beak, and not its point, advances along the prostatic urethra, the form of which in advanced cases of enlargement, as we have seen, admits of this action, until arrived at the step or bar at the neck of the bladder, over which the same gentle pressure, slightly varying the direction, in order to "humour" its course, may cause it to glide directly upwards into the bladder. The adaptation of the instrument to this form of urethra is seen by examining figs. 3, 4, 5, and 6, at pages 23, 24.

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* Op. cit. p. 191.

I have not had any experience of this instrument for cases in which I have previously failed by other means. I have, however, introduced it in the manner described with ease, for some of those to which it has been adapted, for the purpose of trial. I cannot, therefore, speak of its superiority as a final resort, that is to say, after the failure of the curved instruments, flexible and inflexible, for which emergency chiefly its author recommends it; and it is necessary to add that he regards it under these circumstances as often superseding the necessity for forcible catheterism through the median portion ("third lobe"), or the puncture of the bladder. I certainly should not fail to try it where such are encountered, and confess that I should do so with some degree of confidence. I have but once been compelled to puncture the bladder in retention from enlarged prostate, but in that case under circumstances which would have rendered Mercier's catheter as useless as all others were under the conditions then present. This case, which was one of considerable interest, will be reported when the subject of puncturing the bladder comes before us. (*Vide* page 186.)

The question occasionally arises, is it desirable at once to evacuate the entire contents of the bladder when retention has existed for a considerable period of time? In very rare instances the removal of a large quantity of urine, amounting to several pints, has been followed by fainting and depression, from which the patient has never rallied. When the extent of vesical dulness is very considerable, it is therefore prudent to afford relief in a gradual manner, and, supposing that the catheter is retained, this may easily be accomplished. The removal of some thirty or forty ounces will probably afford complete ease, and after the lapse of half an hour or an hour another portion may be withdrawn; in this manner the bladder may be gradually brought to adapt itself to the normal condition of contraction, which, subsequently, as a rule, must be insured at least once or twice a day.

A point of some importance remains. A catheter having been introduced with some difficulty for the relief of retention, should it be permitted to remain? This question is answered negatively and affirmatively by different authorities. In support of the negative it is said that the parts are already in a state of considerable irritation, and that it is therefore undesirable to permit any chances of adding to it, of which the presence of a catheter may be one. On the other hand, it is urged that the bladder, after long retention, will very soon fill again, that the obstruction may again act as before, and that less hazard is incurred by the presence of the instrument than by a probable repetition of the efforts to place it there, the argument receiving additional force if more than ordinary difficulty was experienced in passing it in the first instance. I confess I have no hesitation in coinciding with the latter view, as the rule, reserving the right to make exceptions under peculiar circumstances. I have seen great danger incurred by the too early removal of a catheter which had relieved an urgent attack of retention.

The next question presenting itself for solution is, what step is to be taken when it is imperatively necessary to afford speedy relief to retention, all attempts by gentle catheterism having failed?

Rarely as such a condition of things is or ought to be realized in practice, it must occasionally present itself. We must, therefore, be prepared for the best method of encountering it. An artificial opening must be made into the bladder; this may be accomplished by perforating the obstructing portion of the prostate, or by puncturing the bladder from some external part. The different operations involved by these proceedings shall be first described, and their applicability to the various phases of prostatic retention discussed hereafter.

Perforation of the obstructing portion of the prostate, in other words, forcible catheterism, is usually performed with a strong silver catheter, about No. 9 or 10 in size, of somewhat conical form at its point, rather longer than the ordinary catheter, but not possessing the large curve of the full prostatic instrument. The operator introduces this to the seat of obstruction, and satisfies himself by means of a finger in the rectum that it lies fairly in the urethra, and is engaged in the prostate: he then steadily carries it onward towards the cavity of the bladder, by pressing the point firmly forwards, and at the same time slowly depressing the handle; and he desists on feeling that the point is free in a cavity, and on finding that the urine flows through the instrument. This has been done by Home* and Brodie.† Liston accomplished it with a cutting stilet "carried through a slightly-curved and long canula," and "practised the operation a few times successfully." ‡ Whatever be the instrument employed the surgeon must be particularly careful to maintain it in the middle line of the body, and also to aim at making the point emerge just behind the neck of the bladder, neither too near the pubes on the one extreme, nor the posterior wall of the bladder on the other. The catheter or canula, as the case may be, should be retained not less than forty-eight hours afterwards in the bladder, that the tissues around may consolidate, and no difficulty be experienced in replacing it by a catheter when withdrawn.

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* Practical Observations on the Treatment of the Diseases of the Prostate Gland. By E. Home. London, 1811. Vol. i. p. 163.

† Lectures on the Diseases of the Urinary Organs. By Sir B. C. Brodie. 4th ed. London, 1849. p. 195.

‡ Practical Surgery. By Robert Liston. 4th ed. London, 1846. p. 485.

Puncture of the bladder is performed in three ways; above the pubes, through the rectum, and through the pubic symphysis.

The suprapubic, at one time regarded as the only possible mode of reaching the bladder from the surface in cases of enlarged prostate, is performed as follows:—The patient being placed in a half-sitting, half-reclining position, and the pubes shaved, a vertical incision of the integument is made directly above the symphysis pubis, about an inch and a half or two inches in length at the surface; this is to be carried downwards through the linea alba, so as just to admit the tip of the finger to reach the distended bladder. Meantime an assistant, standing behind the patient, should press one of his hands firmly on either side, against the abdominal walls, in such a position as to steady the bladder. A straight, or a slightly-curved, trocar (if the latter, the convexity of the curve should be upwards) is then to be carried, with a very little inclination downwards into the bladder. It is better not to empty the viscus immediately when very large, but to draw off its contents by degrees, as alarming syncope has occurred on sudden removal of the pressure from the abdominal circulation. After the operation the canula should be exchanged for a silver tube specially adapted to slide through it, secured by tapes and a T bandage, which may remain a variable length of time, at all events until lymph has been effused upon the edges of the wound, when it may be withdrawn, and an elastic gum catheter worn in its place, an instrument which is said to be generally better tolerated by the bladder than one made of metal.

The puncture by rectum, commonly adopted in stricture, but which has also been resorted to in a few cases of retention with enlarged prostate, may be performed in the following manner. The rectum having been emptied, if necessary, by means of an enema, the patient is to be placed on his back, in the position for lithotomy, and firmly held by two assistants, not tied. The surgeon is then to introduce the forefinger of his left hand into the bowel, and ascertain the limits of the prostate, defining its boundaries, if possible, particularly the posterior one. *Fluctuation should be felt there,* communicated through the contents of the bladder, from a tap, or from momentary pressure made on the hypogastric region; and the point at which it is most distinctly perceived in the median line selected. Any spot within fair reach of the finger, under the circumstances of retention and consequent distention of the parts, may be considered safe as regards the peritoneum. Having directed an assistant to support firmly the lower part of the abdomen with both hands, so as to press down and steady the bladder towards the rectum, a well-curved trocar, seven or eight inches long, should be carried along the finger, and carefully directed to the part indicated; the handle is then to be depressed, and the point carried upwards through the coats of the rectum and bladder, until it is felt free in the cavity of the latter. The canula is to be carefully kept in its place while the trocar is withdrawn, and afterwards retained there by means of a bandage and tapes. In order to prevent the liability to slip from the bladder, which the ordinary canula is found to exhibit, Mr. Cock, of Guy's Hospital, has contrived one, the extremity of which can be made to expand somewhat after its introduction into the bladder, and with which there is therefore less danger of the occurrence of that accident. The form is that of the trocar generally employed, but increased in length and thickness.[*] I have twice performed the operation with Mr. Cock's instrument, and have no hesitation in saying that I prefer it to the original one.

Lastly, there is the puncture of the bladder through the symphysis pubis.

This operation appears to have been first proposed by Dr. J. M. Brander, now of Jersey, in the year 1825, when a student in Paris, where he read a paper on the subject to a medical society advocating its employment on theoretical grounds alone, derived from the supposed advantages of the situation regarded anatomically.[†] Subsequently he presented a paper on the same subject to the Royal Medical and Physical Society of Edinburgh, and afterwards to the Medical and Physical Society of Calcutta, in whose Transactions it is published, an account of a case being appended.[‡]

Several successful cases have since occurred in the practice of Dr. Brander and others. One in that of a man aged seventy-two, in whom the retention occurred from prostatic enlargement, has been performed by Dr. Leasure, of Newcastle, Pa., and is recorded at length in the American Journal of Medical Science, April, 1854.

Dr. Brander appears to have employed in the second, if not in the first, of the two cases reported, an ordinary hydrocele trocar of middle size, although he speaks of one flattened in form in the original paper. The cylindrical instrument seems to offer an advantage alluded to by Dr.

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[*] Medico-Chirurgical Transactions. Vol. xxxv. p. 186.

[†] Séances de l'Athenée de Médicine. 1825.

[‡] Transactions, 1842. Vol. viii. part 2, pp. 208-239. A Paper on the subject, and one case read December, 1839. In the Appendix to this volume is a second case, which occurred in 1841. The first patient died in a few hours, the second in about nine days, after the operation.

Brander, from its form admitting of a rotatory motion as well as of direct impulsion. The patient should recline, and the trocar should be introduced, whether after a small preliminary division of the integuments or without it, appears to be immaterial, about the centre of the symphysis, reckoning from above downwards, and in a direction at about right angles to the vertical axis of the body. Dr. Brander says, "somewhat obliquely downward and backward toward the sacrum, varying the direction according to circumstances; a piece of flexible catheter is then to be introduced through the canula," and retained by a tape.

In reviewing the comparative merits of these four forms of operative procedure, the task may be narrowed to some extent at the outset by dismissing one of them, the puncture above the pubes, with but few remarks. Most surgeons appear to be pretty well agreed that this is the most dangerous mode of reaching the bladder, and there appears to be a growing conviction that it should only be resorted to when the extreme size of the prostate renders the rectal operation impossible. Although sometimes successful, and affording a relief which has continued for several years,* it is often otherwise, and is always attended with some risk of extravasation and suppuration behind the pubic symphysis, or beneath the peritoneum. It may be regarded as the mode which is to be employed when circumstances forbid the adoption of other means.

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* There is a preparation in the museum of the Royal College of Surgeons exhibiting the bladder and prostate of a man aged 66, on whom the operation was done for retention from enlargement of the latter organ, who lived four years subsequently, resuming his former business habits. No. 2043. My friend Mr. Paget, of Leicester, informs me that he has a patient now living, who wears a short flexible tube above his pubes, upon whom he performed this operation fifteen years ago; and during the whole of this period he has evacuated all his urine by means of this tube. He has another patient who has done the same thing for two years. Neither will consent to part with their tubes from the great relief afforded: both follow their occupations with comfort and regularity.

The puncture by rectum, which has been employed occasionally to afford relief in these cases, as our museums testify, is nevertheless almost universally stated by authors to be inadmissible when the prostate is enlarged, an occasional exception being made in favour of the operation when the enlargement is not considerable. It is, perhaps, a question whether its applicability to a large proportion, it may be said to a majority, of prostatic cases, has not been overlooked by many. There are certainly rare and exceptional examples of prostatic enlargement in which the finger is unable to reach the tumid bladder behind, and detect fluctuation there. Where this can be satisfactorily done it is difficult to imagine the objection to the operation. It is the more desirable to make the opening through the rectum, if there be any doubt about the existence of a distended bladder above the pubes; for there may be imminent danger from retention without the presence of this condition. And further, in a corpulent patient, its detection, if present, is not always satisfactorily to be accomplished, while in such a person the suprapubic operation is less easy, or, at all events, less advisable. I have only on one occasion been compelled to puncture for prostatic retention, and on this performed it with ease and success by the rectum. This case is an instructive one, and is subjoined; it also exhibits the circumstances which must compel the surgeon to demur to the soundness of the well-known proposition of Desault, that puncture of the bladder ought in no circumstances to be performed.

CASE NO. IV.

In December, 1853, I was summoned at night by his medical attendant to see a gentleman in the Regent's Park, who was suffering from complete retention of urine. He was seventy-three years of age; had experienced more or less difficulty for ten or twelve years past, but had not required medical aid until the last three weeks. He had passed no water since the preceding night, and was suffering greatly. Repeated and prolonged attempts had been made without success, followed by bleeding. On examination I found vesical dulness midway to umbilicus; and through the rectum, a considerably-enlarged prostate. I first introduced a long and well-curved silver catheter, but not succeeding, mounted a No. 10 gum elastic one, upon a strongly-curved stilet, and introduced it without any difficulty into the bladder. It had evidently glided over an obstruction at the neck. Three pints of high-coloured urine were drawn off. I left the instrument in, and advised it to be retained at least forty-eight hours. Next day I heard the patient was extremely comfortable.

At midnight following the second day, I was again sent for. I learned that the catheter had been removed, contrary to my wish, in the morning at ten, about thirty-six hours after my first visit, that he had passed no water since, and that, prior to this summons, prolonged and painful attempts to replace it had been unavailingly made, and attended with very considerable bleeding. I again employed the catheter, but now found, despite all my efforts, the beak of the instrument invariably slipping near to the rectum, where it could be felt with too much distinctness. The patient was weak and suffering severely, straining violently, and begging for relief. Medicinal agents had also been fully administered. I proposed, therefore, puncture of the bladder, and, being able to detect fluctuation beyond the prostate as far as my finger could reach, decided upon performing it there, which I did without any difficulty in the manner described above—drawing off again a large quantity of high-coloured urine. The canula was tied in, and retained some time, as it gave little inconvenience. I saw this patient no more after the first fortnight, as he was exceedingly comfortable, and exhibited extreme repugnance to the introduction of a catheter, the necessity for which I endeavoured to insist upon. I subsequently learned that he lived more than two months after this, gradually sinking, with no other symptoms than those of increasing debility; that the canula was retained during that period; and that disease of the prostate, bladder, ureters, and kidneys was found after death, but that the urethra was not opened. I believe he never permitted any attempt to be made to pass a catheter by the urethra.

High authority, both by example and precept, exists, for the practice of puncturing the obstruction itself, whatever it may be, in most cases undoubtedly an enlarged median portion of the prostate, by means of a silver catheter, or cutting instrument. And the inconvenience which a canula in the rectum generally occasions, if retained there for any longer period than a few days, must be admitted as an objection to the rectal operation. But the cases will be very few indeed in which the urethral canal cannot be rendered pervious to the catheter after a little rest and withdrawal of the urine by another channel, when the canula may be removed, and the opening between the bladder and the bowel heals rapidly enough.* Where the operator has not much hesitation in assuring himself that the point of his instrument is not lodging in a false passage, but is placed in the prostatic urethra and impinges against an otherwise impassable obstruction at the vesical neck, I believe the best proceeding will be to introduce an instrument similar to a trocar and canula; but sufficiently long, and shaped nearly like a middle-sized prostate catheter (although with less curve), and perforate to a necessary extent for relieving the bladder. I have proposed a slight modification of this instrument, which was used by Liston, which I think is likely to be useful. Instead of the trocar being made to fill completely the canula, a small groove should be hollowed out in its substance from the side, so that the moment of its entry into the bladder may be announced by a small stream of urine issuing through the groove. Otherwise, the arrival of the instrument at the bladder can only be learned by withdrawing the trocar (see fig. 17).

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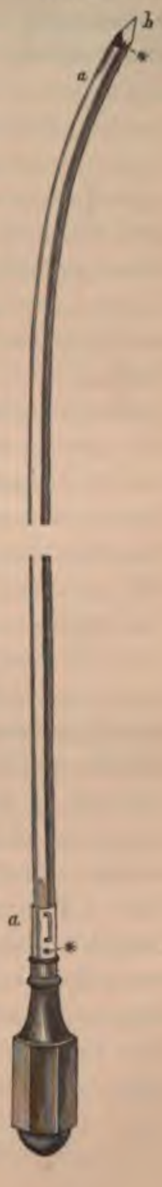
* For further observation respecting this matter, and in relation to the whole subject of the puncture of the bladder per rectum, see the Author's work on the Pathology and Treatment of Stricture, chapter xi.

There is yet another mode of reaching the bladder already described, which, as far as I am acquainted, has not been yet performed in this country, but which, undoubtedly, possesses claims meriting our regard—viz. the puncture through the pubic symphysis. I can add nothing respecting it from my own experience on the living subject. On the dead I have repeatedly performed the proceeding; and in elderly subjects have found a good deal of force necessary in order to introduce the trocar through the symphysis. The interosseous cartilage is very narrow in such subjects—indeed sometimes nearly ossified—a condition which I have verified by dissecting and macerating six examples between sixty and seventy years of age. Nevertheless, I have never failed to puncture the viscus safely with a trocar in these trials. The theoretical objections which have been made to it are, the possible occurrence of urinary infiltration into the cellular interval between the bladder and pubic bones, and of peritoneal inflammation by extension from the wound. The advantages claimed for it are, on the other hand, the ease with which the bladder may be reached in this situation, even should the organ be contracted in size, or the pro-

Fig. 17.



EXPLANATORY NOTE.—*a a*, Canula; *b*, Point of cutting stilet. The upper asterisk points to the groove described, and the lower one to the aperture for escape of urine.

state be greatly enlarged, and the facility with which the catheter may be used and retained in the wound, or replaced after removal if necessary; add to which, it may be regarded as a more desirable situation than the rectum in relation to the comfort of the patient himself. As far as the objections referred to are considered, it is but fair to state that they appear not to have been encountered in practice, and hence they cannot be regarded as possessing any very great weight. It is a proceeding which doubtless well deserves the consideration of practical men, and experience appears to warrant a trial of its merits when opportunities offer for testing them.

An operation in the perineum, which has for its object the opening of the urethra at the membranous portion, or near to the apex of the prostate, has been recommended, and in one case practised, by Dr. Lawrie, of Glasgow, in retention from enlarged prostate. He introduces into the urethra a grooved lithotomy staff, preferring the angular staff of Dr. Buchanan with a short beak, and opens the canal upon it for an extent just sufficient to admit the finger at the point named. From this opening he passes an almost straight metallic catheter, twelve inches long, and open at each end, into the bladder. Through this open tube a probe-pointed wire can be introduced, upon which, after withdrawing the former, an elastic tube will glide into its place, should such an one be preferred for the purpose of retaining in the bladder.* This proceeding appears to me calculated to be successful in those cases in which the urethra has not received any serious injury from violent catheterism. It sometimes happens, however, that from this cause false passages have been made below the prostate, constituting, in fact, the difficulty for the solution of which the question of employing a knife or trocar is entertained (as in Case IV., p. 186). In such circumstances, an incision upon a grooved staff might, perhaps, lead only to embarrassment, as the urethra might still not be opened or even found.

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* Glasgow Medical Journal, July, 1854. p. 211.

Provided, however, that this lies safely in the urethra, there is not much doubt that an instrument may be passed without much difficulty from the perineal opening, upwards into the bladder. I fear, however, that a urinary fistula would always remain. Sinuses of this kind in the perineum, associated with enlarged prostate, are particularly rebellious to treatment; indeed, do not generally close so long as the patient is troubled with frequent micturition and unhealthy urine. However simple and effectual this mode of relieving the bladder may in some cases be, the probability of the result alluded to should, I think, not be overlooked.

Our present experience of the various procedures detailed may be stated in the form of conclusions, which, if not absolutely established, may be regarded as fairly deducible from the available data, and therefore as approximatively correct.

1. That the cases of urinary retention from prostatic enlargement which cannot be relieved by the introduction of a catheter, over and beyond the obstruction at the vesical neck, are extremely rare.

2. That when it is necessary to make some artificial opening into the bladder in order to afford relief to such a case;—if the beak of the catheter can be carried along the urethra to the obstruction in its prostatic part, perforation may be made, either with that instrument, or with one of similar form, containing a cutting stilet, expressly adapted to the purpose.

3. That if the condition of the urethra, from the existence of false passages, laceration, or other lesion, be such that the operator cannot be certain of his ability to carry a

catheter fairly along the canal to the obstructing portion of the prostate, some other mode of entering the bladder must be adopted; in which case, if fluctuation can be distinctly felt within easy reach of the finger, in the median line behind the prostate from the rectum, the puncture through that bowel is an easy and safe mode of giving exit to the urine.

4. That if, on the contrary, fluctuation cannot be distinctly felt by the rectum, the puncture through the bowel is a proceeding of doubtful propriety; and the question of opening the bladder, either above or through the pubic symphysis, must be solved for the case in question. That the former operation may be regarded as much less hazardous, when the patient is not corpulent, and vesical dulness can be clearly defined in or above the hypogastric region.

5. Lastly, that the experience of the operation of puncture through the pubic symphysis is not extended enough at present to permit of a comparison being made in regard to its results, with other modes; but that it is sufficient, coupled with the apparent advantages derived from anatomical considerations, to recommend the operation to the test of practice, in order that its merits may be duly ascertained.

CHAPTER IX.

ENLARGEMENT OF THE PROSTATE FROM INFLAMMATION.

This form of Enlargement met with in Youth and Middle Age, and wholly distinct from Hypertrophy.—ACUTE INFLAMMATION.—Causes considered.—Symptoms.—Treatment.—Course of complaint.—Subsequent Chronic Inflammation, with Induration and Enlargement.—Treatment necessary.—Suppuration of Prostate.—Treatment.—Abscess—its course and consequences.—Cases.

ENLARGEMENT of the prostate may be the concomitant result of an attack of acute inflammation, and be due to the same actions which constitute that process in any part of the body, external or internal. Or it may be the final result after those actions have ceased, being constituted by interstitially effused matters, either lymph or pus, which have remained unabsorbed during a longer or shorter period of time. Or, as appears rarely to be the case, it may result from a chronic or subacute inflammation, no previous acute attack having existed.

These forms of enlargement most commonly occur in the period of youth and middle age, and are essentially distinct from that variety peculiar to advanced age, which has been already studied in the foregoing pages. The single character of enlargement is the only one which these different affections have in common with each other, and it is important to bear in mind this distinction in commencing the consideration of the following morbid states to which the prostate is also subject.

1. ACUTE INFLAMMATION OF THE PROSTATE.—This is by no means a common affection, if regarded as distinct and

unassociated with inflammation of the urethra or bladder. When the latter organ is inflamed, the prostate appears sometimes to suffer, although in a secondary manner and degree. But in obedience to the common law which seems to apply to tracts of mucous membrane generally, inflammation appears commonly to travel from the external to the deeper parts. Accordingly an attack of urethritis, involving the external inch or two of the urethra, may spread inwards and fix itself, as I believe is not unfrequently the case, upon that portion of the canal which is most largely surrounded by vascular tissue, viz. the bulbous portion. Hence, probably, the origin of stricture formation affecting that locality especially. But it may proceed, as an exceptional occurrence, more deeply still, and then the prostate becomes the subject of inflammatory action. Such is the most common mode by which this organ is involved. It may not be out of place to observe, that in the respiratory tract the same line of march from the external to the internal parts is observed. A catarrh, for example, is the first sign of inflammation in the mucous membrane of this region, the action may gradually spread to the throat, larynx, bronchi, and so on to the lung substance itself. The converse order of things we do not observe, and after the same manner also in the genito-urinary tract we find that inflammation is to be traced, as a rule, from the urethra to the prostate, bladder, ureters, and last of all, it may be, to the kidneys. Sometimes, however, the prostate is inflamed apparently as a purely idiopathic occurrence, and not by continuity of tissue. This, excepting the cases produced by violence, as by instruments, &c., is probably extremely rare.

Causes.—Systematic writers on this subject enumerate many circumstances as giving rise to acute inflammation of the prostate. The relation between some of these and the supposed effect appears, however, to be less clear than the precise statements generally made might lead the inquirer to imagine.

The alleged causes may be arranged for consideration in three classes, as follows:—

(*a.*) Undoubted causes of acute prostatitis.

The pre-existence of acute inflammation of the urethra from any cause, but especially the gonorrheal, by continuity, as already alluded to. Urethral stricture in an aggravated form, tending as it does to the production of inflammation and disorganization of all the parts posterior to it, especially those more immediately adjacent, as the prostate and bladder. The direct application of irritating agents in the shape of strong injections, cauterization, and mechanical violence of various kinds. Inflammation of the bladder sometimes. Calculi of the bladder. The application of cold and damp to the perineum, as by sitting for a long period on moist ground, perhaps most frequently in gouty and rheumatic subjects. Urethritis has been referred to as a proximate cause, but it may also be the remote cause in the circumstances last enumerated, as well as in some of those which come under the next head.

(*b.*) Circumstances which cannot be stated with absolute certainty to be causes, but which may, with some amount of probability, be so regarded.

Horse exercise is constantly said to be a cause of acute inflammation in the organ, by means of the concussion occasioned. Evidence is wanting, I think, to establish this. That it may aid in producing it when some inflammation of the urethra already exists, is quite possible. Certainly it cannot be said that hard riders, such as huntsmen, jockeys, but above all the cavalry soldier, from the nature of his seat, are in any notable degree more subject to it than are other men equally exposed to other and better recognized sources. Cantharides may, perhaps, occasionally act as a cause when taken internally, but probably never without affecting the kidneys and bladder also, and in a primary manner. Alcoholic drinks, especially when mixed with acids, as punch, may induce prostatic inflammation, gonorrhœa already existing, but only on this condition. Inordinate sexual intercourse, under the last-named circumstances, may probably be assigned also to the present category.

(*c.*) Circumstances stated to be causes by numerous authors, but respecting which there is either little or no evidence to render it probable that they are so.

Diuretic medicines, copaiba, cubebs, and turpentine, even coffee, and highly-seasoned dishes, are said to cause inflammation of the prostate. Drastic purgatives are similarly regarded by some. Irritations in the rectum, by ascarides, hæmorrhoids, &c., are enumerated as causes. All these may, and do, undoubtedly sometimes induce an irritable condition of the bladder, and some of them, perhaps, even some degree of inflammation of the viscus, but I am not aware of any authenticated case of acute prostatitis directly or indirectly occasioned by any of these agents. The morbid condition of the organ which exists in the presence of carcinomatous infiltration, or of tuberculous deposit, cannot be regarded as by any means identical with the affection now under consideration. Nevertheless, the diseases referred to are commonly enumerated as causes. Such a course appears to involve confusion, and to destroy the definite meaning of terms, which it is extremely desirable in all pathological studies to maintain distinct and inviolate as far as possible.

Sedentary habits are spoken of as a cause of the affection, but without the slightest shadow of evidence to support the assertion, as far as I have been able to discover. The same also may be said with regard to a constipated habit of body. It is probable that want of exercise and a torpid state of the bowels, both tend to induce a loaded condition of the portal system, of which the veins of the prostate form one of the roots or extremities; and in this manner a mechanical congestion of these vessels, which are large in and about the prostate, as well as of the proper capillaries of the organ, is doubtless favoured, but how far this may be considered causal even in a secondary or predisposing relation, of acute inflammation, it might not be very easy to state.

SYMPTOMS.—At the outset, a sensation of weight and fulness about the rectum and perineum is experienced, with some pain and uneasiness referred to the neck of the bladder. The patient requires to pass water more frequently than natural, and does so with an increase of the existing pain, especially at the close of the act. These symptoms increase; the pain becomes severe, then lancinating and pulsatile, and almost continuous; a sense of tension and swelling is experienced, and the anus and perineum are tender when pressed upon. Movements of the body become difficult on this account, as does also the sitting position. The act of relieving the bowels at stool produces considerable distress; still more so does the act of micturition; the stream of urine being generally small, and its passage necessarily prolonged, much straining accompanies it, and the pain is exquisitely acute. In these circumstances a finger introduced into the rectum encounters much opposition, however quietly it is carried through the sphincter; the anterior wall of the bowel is prominent, hard, and hot, and the outline of the prostate may be traced, not, however, without causing great suffering to the patient. An attack of piles may be induced, the close contiguity of the hæmorrhoidal and prostatic veins appearing to favour this result. At a later stage, if suppuration has taken place, the rectal swelling is softer, local throbbing is experienced, and should a catheter be passed, the patient will complain of excessive pain when the instrument reaches the prostatic part of the urethra. General fever, in a greater or less degree, manifests itself after the accession of the earlier local symptoms, rigors and exacerbation accompanying the onset of suppuration. Pains in the back and loins, as well as in the glans penis, and running down the thighs are experienced, and not unfrequently a sensation of constant desire to go to stool. The mucous membrane of the bladder participates more or less in the inflammation; the urine is febrile in character, and generally contains mucus to some amount, occasionally in considerable quantity, the latter condition probably indicating some implication of the bladder. Besides this, there may be pus in the urine to a greater or less extent, from which it is deposited as a sediment on standing. The chief marks upon which a diagnosis depends may be noted as follows: enlargement of the prostate, ascertained by rectal examination, the prosecution of which is extremely painful to the patient, with acute pain complained of when pressure of the finger is made upon any part of the swelling there. The act of defæcation is often productive of much distress; that of micturition still more so. If a catheter is introduced, exquisite suffering is caused when it arrives at the prostatic part of the urethra. Added to these there is constant and deep-seated, often throbbing, pain felt about the fundament. These symptoms alone, but especially when associated with a history of recent urethral discharge, which may have previously ceased or not, will suffice to determine the nature of the case.*

TREATMENT.—It is unnecessary to enter here into the full detail of that which constitutes the ordinary constitutional treatment of inflammation. In general cases the antiphlogistic regimen and diet, as commonly understood, should be observed. I have seen no reason to bleed from the arm, or to give calomel—except as a purge, but prefer the administration of antimony and full doses of alkali, such as the bicarbonate or acetate of potash, to the extent of about three or four drachms during the twenty-four hours, if the former, and four or five, if the latter be employed. I have occasionally almost doubled these quantities in a strong subject, and I think with advantage. The dose of antimony may vary between the eighth and the fourth of a grain, to be repeated very frequently, say, not less than every two hours if the inflammation is severe. The bowels should be freely opened at the outset, and a gentle action upon them maintained afterwards. The hæmorrhoidal and prostatic veins very freely intercommunicate, and are so commonly found after death loaded with blood in most cases of inflammatory disorder affecting the urinary organs, that there can be no doubt as to the propriety of ensuring, as far as in this manner may be possible, the free return of blood through the liver by the portal system.

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* Some exceedingly well-detailed cases of acute prostatitis are given by Vidal de Cassis, who has paid special attention to this affection, in the Annales de Chirurgie. Paris, 1844.

The local treatment demands a more special notice. Bleeding from the neighbourhood of the affected part often affords greater relief than any other single agent, and the mode of abstracting blood must depend in some measure upon circumstances. In most cases the application of leeches is the most available means. They should be employed in large numbers, as from twelve to twenty, on the perineum and around the anus, the latter, perhaps, being the more important situation. An exceedingly expert cupper will, with no very great pain, and in a short time, obtain eight or ten ounces of blood from the perineum; but it is very rare to find any but the most dexterous and practised professors of cupping successful in accomplishing this, and in default the leeches will certainly be preferable. Leeches to the rectal surface of the organ, introduced by means of tubes devised for the purpose, have been recommended by some, but the effect to be produced in this way must be small, as one or, at most, two leeches can be applied at a time.* The bleeding over, a hot hip bath should be taken, for a few minutes only, then a large poultice or hot flannel placed to the perineum, and the patient be wrapped up warmly in bed. The hip bath may be frequently repeated with advantage in the course of the treatment, but should never be applied at any one time for a lengthened period. From six to eight minutes is the longest time I think it right to permit a patient, who is suffering from inflammation of the prostate or bladder, to sit in the bath, which should commence at about 100°, and be raised to about 103° or 105°, during the period named. Such a method of using this most valuable agent appears to me much more advantageous than prolonging the sitting to fifteen or twenty minutes. The object of the bath is not to induce a flow of blood to the pelvic viscera, but, on the contrary, to expand and fill the vessels of the skin by a smart impression quickly made upon it, one which is also participated in to a certain extent by every part of the cutaneous surface. And it is by using the bath in the manner described that a general diaphoresis is effected, and a temporary congestion of the pelvic *surface* produced, with the result of relieving that of the deeper parts. During a prolonged hip bath, it often happens that the perspiration at first induced becomes checked, congestion of the pelvic viscera is rather encouraged than reduced, and of course no relief or benefit, but, on the contrary, some uneasiness, or even injury, may be occasioned by this abuse, rather than use, of an admirable remedial agent.

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* The instruments which have been employed for this purpose are described and figured in the *Lancet*. Vol. xxxix. p. 645, and vol. xl. p. 299.

In the course of a few days, the severe pain and the frequent micturition gradually subside, as a rule, often, however, not without the occurence of an occasional relapse for a day or two, sometimes, indeed, even of a severe character. Such untoward circumstances are generally attributable to some slight indulgence on the part of the patient, especially to exercise too freely taken, or at a too early period. Hence it is necessary to restrain with firmness the activity which a young and generally hearty patient is ready to display as soon as his complaint begins to recede. Care and moderation in diet, with total abstinence from alcoholic stimulant must be enjoined for a time, and the season of convalescence should especially be watched and appropriately managed, as means must now be taken, not merely to restore the general health on the ordinary principles of nutritive and tonic regimen, but to reduce the bulk of the organ, enlarged as it is prone to remain from the effect of the inflammatory process. Speaking in general terms, the prostate will be found on examination after the lapse of about a month from the subsidence of the acute symptoms, as large as it was then, tender, but not by any means exquisitely so, firm and resisting to the finger, and, if necessity exists for passing a catheter, it will be found necessary to depress the handle of the instrument to a greater extent than in a healthy subject before the urine flows, while the operation is still attended with no little uneasiness, especially when the instrument traverses the prostatic portion of the urethra. There is more than the natural amount of exertion required in order to empty the bladder, and the stream is propelled with less than the usual degree of force.

Such are the only effects remaining when the acute affection terminates in a healthy resolution. Unassisted by treatment, it is very long before the enlargement subsides; it is doubtful, indeed, whether in such circumstances it does ever do so completely. Very often, however, other signs of derangement persist. There is frequently some increase of muco-purulent discharge of the urethra, amounting to more than an ordinary gleet. The urine is cloudy, and deposits more or less pus on standing. After passing it, a little blood may follow. The patient does not find himself altogether free from the sense of fulness, and of dull pain, which he refers to the neck of the bladder. There may be some persistence also of smarting pain during micturition, and during sexual intercourse also, in the posterior part of the urethra. He is the subject of undue irritability of the bladder, and this, as well as other symptoms, are easily increased by slight errors in diet, or any but moderate exercise.

Such are the usual signs of a persistence of inflammatory action in a degree or mode which may be called chronic, or subacute. It co-exists with that kind of enlargement which appears in youth, and differs completely, as has been before said, from that which occurs so frequently in advanced age. It is prone to remain, sometimes as a source of some little trouble and uneasiness, but not always, for a considerable period of time.

This enlargement and induration may be reduced, and for this purpose it should be our aim to employ appropriate means without delay, inasmuch as the facilities for producing absorption of inflammatory exudations, undoubtedly diminish in proportion to the length of time during which they have existed.

The general health being vigorous, those internal remedies which appear to possess a specific power to promote absorption of the effused matters should be employed. Such are the iodide and bromide of potassium. They may be administered conjointly or separately, the latter agreeing with the stomach sometimes when the former will not. Frequently either agent may be advantageously combined with fifteen or twenty grains of the acetate or bicarbonate of potash twice a day, or with two or three scruples of the tartrate of potash, if there is a constipated habit of body. These are the more indicated if the urine presents an unduly acid, and therefore irritating character. If the enlargement is considerable it is desirable to employ also local measures. No means should be left untried to restore the organ to its normal size, as it may deviate very considerably, and be productive of long-continued uneasiness in this condition. I have had recently under my care two patients, one at twenty-eight, the other at thirty-five years of age, with enlarged prostate; in the former it was very considerably so, and was caused by a severe attack of acute inflammation, which he experienced three years ago; in the second, the enlargement, from the same cause, is so extreme as to render a rectal exploration even somewhat difficult from the great projection of the organ into the bowel. In both cases, the latter especially, the frequent occurrence of symptoms of irritability of bladder, and of pains in the perineum and loins, appeared to be due in great measure to this abnormal condition.

The local means which appear to be useful are, iodine suppositories, hip baths, plain, and impregnated with iodine and bromine, in the same manner as advised in Chapter vii. page 151. The treatment there recommended, in order to promote absorption, may be followed, if the case is one for which the use of external as well as internal means is desirable. At the same time, everything must be avoided which might occasion derangement of the general health; there should be no unnecessary passing of catheters; walking exercise to be taken freely, but not riding on horseback, at all events for a considerable period after the acute attack. A considerable amount of perseverance in the use of these means is necessary, but very decided benefit may be anticipated from it.

But acute inflammation may not be followed merely by a degree of chronic inflammation and induration, varying in extent, and tending to be permanent. Especially when neglected or inefficiently treated, or more than ordinarily obstinate, and when occurring in a naturally weak or delicate constitution, it may eventuate in suppuration of the organ, or it may subside, but so slowly and imperfectly, as it were, that a condition of subacute or chronic inflammation may be established, and remain during a long period.

The occurrence of suppuration, as has been before stated, may be suspected when after the first six or seven days the acute symptoms do not subside, when the pain and difficulty of micturition and defæcation increase, if rigors occur, and the patient is very restless and feverish, complaining of great tension and of a pulsating sensation in the perineum and at the neck of the bladder. The fact is determined if by rectal examination the swelling there increases, and communicates to the tip of the finger a sensation of softness and elasticity, in place of the firmness and resistance which were noted before. The act of examining also, although necessary to be performed, is excessively painful, yet, by devoting time and care, it may be made very much less so than would otherwise be the case. Pressure in the perineum may also reveal tenderness and fulness in that situation. The natural course of abscess in the substance of the prostate is generally spontaneous evacuation by the urethra. I have seen it occur immediately after the passing of a catheter, when the patient's condition, in consequence of the tumefaction caused by its presence, has rendered instrumental assistance necessary in order to empty the bladder. Occasionally the matter is evacuated by the rectum. In the case of a gentleman of middle age, recently under my care, two ounces of healthy pus were suddenly evacuated from the enlarged prostate when the patient was at stool, a smaller quantity being evacuated every day for some time after, from the opened cavity of the abscess. In this case the enlargement, which was very considerable, was due to a previous acute attack of prostatitis, complicated with obstinate and narrow stricture of the urethra. Last year I met with an example in the case of a gentleman forty-five years of age, who came from New Orleans, United States, to place himself under my care with a most obstinate and irritable stricture of the urethra, of which he was finally relieved by the external division, which I performed as soon as he was in a suitable condition for it. He had had chronic inflammation of the prostate for some time before, and the organ was much enlarged. Subsequently it rapidly suppurated, and he also at stool evacuated not less than eight ounces of pus from it with great relief. He completely recovered from it. I do not deny the possibility that the abscess in the last-named case may have been situated between the prostate and rectum, as it is by no means always easy to pronounce positively upon this point. In the former case it was undoubtedly prostatic, and the urine passed for some time subsequently by the rectum through the resulting sinus. The spontaneous evacuation of matter by the rectum is perhaps as favourable, generally speaking, as through the urethra. It may be followed by a troublesome urethro-rectal fistula, but not necessarily, or even usually so. On the other hand, although the opening of the prostatic abscess into the urethra may soon close, the walls of the cavity having granulated and united by adhesion, yet if this does not take place, the sac will probably long remain open, and become a receptacle for urine, giving rise to fresh collections of matter around, from the inflammation so produced.

Extravasation rarely, if ever, has to be feared, the parts exposed to urine being defined and thickened by exudation matter. Nevertheless, in many cases I believe the last-named course, that is, by urethra, is that on which we must rely. The only treatment we can adopt in order to prevent it, matter being already formed, is to make an artificial opening in the perineum as early as possible.

The incision for this purpose must be made with some boldness, in the median line, in the known direction of the prostate, inclining a little below its situation in the healthy state, since its bulk is chiefly increased in the direction downwards, a fact, however, which is supposed to be perfectly ascertained by the rectal examination. The forefinger of the left hand having been introduced into the bowel, a long, straight, and narrow bistoury, the cutting edge of which is upwards, should be thrust into the raphé, about three quarters of an inch anterior to the anus in the known direction of the swelling, and the incision enlarged in a straight line upwards, to a slight extent, so as to give a fair patulous opening for the discharge of matter. The depth to which such an incision must be carried cannot be less than an inch and a-half, it may be two inches; less than the former will be probably useless, and if so, unnecessary and injurious.

But it must be sufficiently obvious that the surgeon should be well satisfied of the nature of the case, that is to say, of the existence of a collection of matter in the situation referred to, before he decides on making this attempt to evacuate it by artificial opening. In cases of doubt, we must await the result, confining ourselves to palliating the symptoms which arise, and not unfrequently nature will clear up the case by discharging the pus through the urethra. Under the various circumstances which may be met with, the surgeon must employ his own judgment in deciding upon the course to be pursued, and it must be confessed that occasionally a case will present in which the indications of that course are not very marked or decided.

Occasionally, but rarely, a prostatic abscess has been observed to come forwards spontaneously by the perineum. Such, at least, is stated to be the case. It is contrary to the principle understood generally to hold good with respect to the course of matter confined in all parts of the body, viz. to seek exit in the direction of least resistance; and at all events it usually fails to perforate strong fascial partitions, other shorter and easier routes existing. In the case supposed, the matter must find its way through the deep perineal fascia. It is not improbable that in some of the alleged cases, this barrier was behind the abscess, and not between it and the surface at all, a distinction not always easy to establish. Very rarely prostatic abscess may burst into the peritoneal cavity. Mr. Adams gives an example of this in a case of tubercular prostate.* It is probably a very rare occurrence under any other circumstances.

The discharge of matter from an acute abscess of the prostate is sometimes followed by long-continued suppuration. Chronic abscess may arise also by itself, though not very frequently; and it may occur as the result of confirmed or neglected stricture of the urethra. In the former case either with or without any existence of tubercular deposit. The latter-named affection will be considered hereafter. A few remarks on simple chronic abscess will close this section of the subject.

Suppuration of the prostate having occurred after an attack of acute inflammation, and the abscess having opened into the urethra, it sometimes happens that the action continues, the orifice of the cavity enlarges, urine makes its way into it, fresh irritation is thus constantly maintained, and finally much of the prostate is destroyed, its capsule becoming little more than the sac of a pus-secreting cavity. Sometimes it is limited to one side or lobe only, and sometimes the collections are two or three in number; generally speaking, however, the result found after death is that described. In this case the opening or openings into the cavity are not usually on the floor of the urethra, which forms a bridge across the hollow sac to the bladder, but on the side, or on both sides. This condition is shown in plate III., drawn from a preparation in my possession, from the case of a man under my care at the Marylebone Infirmary. His case, recorded in the fifth volume of the Transactions of the Pathological Society of London, p. 208, and briefly given here, together with another, also now in my collection, in which the appearances were so very similar that a second drawing was unnecessary, will illustrate the course and pathological appearances of the affection better and more truly than any systematic detail of them. I shall therefore refer the reader, in pursuance of this object, to Cases No. V. and VI.

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* Anat. and Dis. of the Prostate. 2nd ed. p. 128.

Case No. V.

Prostatitis and Cystitis after intemperance and exposure to cold, resulting in Abscess of the Prostate.

J. P. Aged 54. Oct. 1854. A man of intemperate habits since 20 years of age. Two or three attacks of gonorrhœa when young. For some years past has had occasional pain when passing water, but nothing which he considered serious.

Six months ago he spent a Sunday at Greenwich, drinking, and rode to London in the evening on the top of an omnibus, the weather being very wet and cold.

Next day he fell very ill, and on Tuesday morning, having passed no water since Sunday, he sent for a medical man, who relieved him with the catheter, without difficulty. He was unable to pass water without an instrument after this, and subsequently became an in-patient of St. Mary's Hospital. Some time after he was discharged passing his urine by the catheter, which he had been taught to pass for himself.

Dec. 23, 1853.—He was admitted under my care at the Marylebone Infirmary.

Present state: he requires to pass water every hour, which he can do only by means of the catheter; and he suffers severe pains about the perineum, pubes, and loins, if the relief is not afforded. No tenderness in hypogastric region; nothing particular noted after rectal examination; no tenderness within reach of finger there. General condition weak. Complexion sallow, expression of much suffering.

Urine;—slightly acid, deposits some mucus, a good deal of pus, and is slightly albuminous. Has had no hæmaturia.

No. 8 catheter passes easily into his bladder. After several observations it is noted that *some urine flows before the instrument passes quite six inches;* after passing it further, more can be drawn off—no calculus, but a tender and rugose condition of the bladder is detected.

During the following three months, he notably improved after several times washing the bladder with warm water, particularly after injecting solutions of nitrate of silver, increased from half a grain to one grain to the ounce. He retained his urine three hours, the mucus disappeared, and the pus greatly diminished.

In April, 1854, he succumbed to an attack of pneumonia. Post-mortem fourteen hours afterwards.

On removing from the body, the penis, bladder, ureter, and kidneys entire, and laying open the urethra from above, it was found healthy as far as to the prostatic portion. Here a large cavity presented itself, capable of containing 10 or 12 drachms of fluid. It undermined the mucous membrane of the urethra, opening into the canal by an aperture the size of a florin, situated on the upper part; thus the floor of the urethra alone remained, forming a kind of bridge through the cavity, which extended below, above, and on either side of it. This cavity is bounded by the capsule of the prostate, the substance of the organ having disappeared. Passing through the cavity is the right ejaculatory duct found to be dissected out entire. It is dilated, admitting a No. 9 catheter until it leaves the prostate, where it opens into the sac of an abscess. The left duct has disappeared, but the opening by which it entered the urethra remains. On examining the base of the bladder, a sac is seen occupying the entire interval between the two vasa deferentia and the vesiculæ seminales, but apparently not communicating with either. There is, nevertheless, a free communication between this cavity and the urethra by means of the right ejaculatory duct, for the catheter above mentioned passed directly into it. This cavity is capable of containing about six drachms of fluid, and may be either the sac of an abscess in the cellular tissue, or one originating in the right vas deferens itself. The latter supposition seems to be more probable from the appearance of the parts.

The walls of the bladder are much thickened, and the mucous membrane is much injected, exhibiting reddish, brownish, and greenish tints, and bright crimson arborescent injection in patches. The ureters are a little above the natural size. The kidneys are above the usual size, and present the appearance of interstitial deposit, with much fat, under the microscope.

CASE NO. VI.

LONG STANDING URETHRAL OBSTRUCTION, INCONTINENCE. ABSCESS OF PROSTATE AND RIGHT VESICULA SEMINALIS.

J. T. Aged 73. Admitted to Marylebone Infirmary, under my care, May 23, 1854. For many years has had much difficulty in micturition and incontinence; beyond this no information can be obtained, as he is evidently fast sinking, apparently exhausted by disease.

Present state: urine passes from him constantly, and he keeps a vessel in bed according to his habit. There is a large opening in the scrotum, which gives exit to much pus. The resident officer had attempted to pass an instrument, but without success; it was stopped at five inches from the orifice. The man is almost pulseless, and evidently dying.

Post-mortem. Bladder much thickened; very rugose; mucous membrane exhibits fine reddish brown and few slatish tints. On laying open the urethra a part in the bulb was found with thickened walls, narrowed, and much lymph deposited on the surface, partially fixing two calculi, each about the size of a small pea. In the prostatic part was seen an opening into the sac of an abscess, formed by the capsule of the prostate, precisely like that just described in the preceding case; with the floor of the urethra bridging over it. Behind it was another abscess, involving the right vesicula seminalis. Both kidneys much diseased, and containing large cysts. As far as the abscess of the prostate is concerned, the engraving representing Case No. V. would suffice to describe the condition very correctly.

CHAPTER X.

MALIGNANT DISEASE OF THE PROSTATE.

A rare Affection; but probably less so than generally supposed.—Why it is so.—Analysis of Tanchou's Tables.—Malignant Disease of Prostate almost invariably encephaloid.—Examination of reported Cases of Schirrus.—Melanotic Deposit.—Ages at which disease appears.—Duration.—Course.—Symptoms.—Hæmorrhage.—The Urine.—Treatment.—Eighteen Cases.—Tabular View.

MALIGNANT disease of the prostate is, undoubtedly, a rare affection. It is a question, however, whether its rarity be not in some respects exaggerated in the general impression which appears to prevail respecting it. I am inclined to believe that a certain small proportion of instances is lost sight of among the very large number of cases assigned to senile hypertrophy. The course of malignant disease, when well marked, it is impossible, with ordinary care, not to diagnose from the last-named affection; but in more chronic forms, perhaps sometimes occurring, but most especially in those cases in which a malignant growth arises in a prostate previously the subject of senile enlargement, the cancerous character is sometimes, I believe, overlooked. For a good example of the co-existence of these two affections, which occurred under my own care, I beg to refer to a case at the close of this chapter. The morbid parts illustrating the course of disease referred to, I exhibited at the Pathological Society of London, in 1854.

In reference to this question of frequency, the statistical researches of M. Tanchou are commonly quoted by writers on this subject, and in the form comprised in the following brief statement. Among 8289 fatal cases of cancer, he met with only five affecting the prostate. It will be desirable, however, to pursue our inquiries a little further with these figures, for the simple statement is calculated at first sight to produce a somewhat incorrect, or, at all events, a not very definite impression respecting the fact. The manner in which they were arrived at is as follows: M. Tanchou made an abstract from the registers of deaths for Paris and its suburbs, of every case in which the fatal result was attributed to cancer, during the years 1830 to 1840 inclusive; reporting *what was believed to be the primary seat* of disease in each case, naming one organ only, and classifying the whole accordingly, with a view, among other points, to form a numerical estimate of the primary seats of malignant disease throughout the body. The total number comprised 6957 females and 2161 males=9118. In 829 cases, the seat of disease was not originally reported, leaving 8289 cases. Of these 1904 were males, and among these the disease was recognized as a primary lesion, five times in the prostate, and all in adults.* But seventy-two cases are given of cancer of *the bladder* without distinction of sex. As a primary lesion, this is, I believe, more frequent in the male than in the female. In the latter sex vesical cancer is almost invariably due to extension from a uterine growth. Supposing, then, that fully, or more than, one-half of these may be claimed for the male sex, it is not unreasonable to suppose that some of these may have been prostatic in their origin. The fully-developed prostatic encephaloma soon becomes vesical, and may often not be distinguishable except by careful examination. Thus in two of the cases reported, Nos. IX. and XXIV., *the bladder was almost filled* by a tumor, which, nevertheless, had its origin in the prostate.

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* Recherches sur le Traitement médical des Tumeurs cancéreuses du sein. Par S. Tanchou. Paris, 1844. pp. 256-261.

Regarding the source from whence these figures were derived, viz. from an ordinary register of deaths, for the purposes of which no special examination is required, it appears to me exceedingly probable that a source of error, so difficult to guard against, must have vitiated the result in relation to this question. And we are entitled, I think, to believe that the proportion of five cases of primary disease in the prostate, out of 1904 male cases of cancer, is very much smaller than the true number.

The prostate may sometimes, perhaps, be affected secondarily; more precise information, however, is required in reference to this matter before any positive statement can be made. I believe, from the few data at present existing, that it is much less commonly the seat of secondary than of primary deposit, and it is in the latter light that it will be spoken of here, unless the contrary is specially indicated.

Almost invariably malignant disease of the prostate exhibits the character of encephaloid growth. After a close examination of all the cases reported I must still adhere to the opinion expressed by Dr. Walshe in 1846, and resulting at that time from an examination of necessarily fewer data than we now possess, viz. that "the evidence of the occurrence of true schirrus of the prostate is defective."* I have tabulated eighteen carefully-reported cases at the end of this chapter, having rejected those respecting which the evidence is insufficient, and among them at least two well-known cases commonly accepted by contemporary authors as examples of schirrus. Granting its existence, the extreme rarity of this form renders minute details absolutely necessary to establish an example. Wanting these, and at the same time bearing in mind the notoriously loose and indefinite manner in which the term schirrus has been commonly employed by the older authors especially—in regard to the prostate—we must not hesitate to deny the admission to a category so designated, of any case, not accurately and intelligently observed.

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* The Nature and Treatment of Cancer. By W. H. Walshe, Professor of Medicine in University College. London, 1846. p. 414.

In the two cases just referred to little beyond the single physical character of extreme hardness of the prostatic substance existed, to support the allegation of schirrus. The presence of encephaloid deposit in other parts of the body was noted in one of them, and to a degree which would indicate that, whatever the prostatic affection might be, it was, at all events, not the primary lesion.

The cases are those by Mr. Howship and Mr. Travers. Mr. Howship's patient, at seventy, had a prostate of normal size, but unusually firm in texture; the disease causing death consisting of large encephaloid masses, involving the vessels, nerves, and viscera in the pelvis and abdomen, and occupying more than half the space of the latter cavity.* Mr. Travers briefly states, respecting a case of his own, "I found the prostate occupied by a tubercle, possessing all the characters of schirrus, upon section, in an old nobleman, long subject to retention."† Wanting the evidence derivable from the condition of the adjacent glands, from microscopical examination of the growth, and knowing the prevalence of firm fibrous tumor in the part affected, it is impossible to affirm the applicability of the term schirrus, as designating a peculiar species of cancer to these two examples. Yet they are adduced as instances by most writers on the subject, excepting, it must be added, by Dr. Walshe in his work above referred to.

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* Med. Chir. Trans. vol. xix. p. 35.

† Ibid. vol. xvii. p. 346.

Melanotic deposit is said to be occasionally found associated with encephaloid of the prostate. Its presence is reported in two cases, one at adult age, the other in childhood. It should not be forgotten, in the examination of these cases, that interstitially-effused blood in a fungous growth may be mistaken for true melanotic deposit, which to the naked eye it sometimes resembles.

Malignant disease has at present been observed only in childhood and at advancing age. No authenticated cases are on record between the ages of eight and forty-one. The duration of the disease, from the first appearance of symptoms to the fatal result, appears to vary from one and-a-half to five years in adults, and from three to nine months in children. It should not be forgotten that in the former class we may encounter a source of error, which, if not pointed out, tends to produce an over-estimate of the duration of the disease. It has been shown that encephaloid deposit may sometimes take place into a prostate previously hypertrophied, and already the cause of obvious symptoms of urinary obstruction. In such a case it is clear that the period which elapses between the first appearance of urinary difficulties and the fatal termination, is not to be regarded as the duration of the malignant disease. Such a case has been already referred to. This condition of things it may not be always easy to verify during life; nevertheless, if, the existence of enlarged prostate having been ascertained some years ago, exacerbation of symptoms rather rapidly occurs, with manifest increase in the size of the tumor, attended by cachexia, above all by enlargement of the lymphatic glands in the neighbourhood, we may pretty safely conclude that malignant action has supervened. Undoubtedly these are very rare cases, still the existence of such may be regarded as undoubted.

In referring to the table of cases, it may be observed that in childhood the encephaloid deposit was limited to the single organ, or to it and to the adjacent lymphatics, although the latter has not been positively reported, and that it ran a very rapid course. Whereas in the adult cases, the development of disease was slower, and other viscera were usually affected besides the prostate. These facts harmonize with those presented by the course of encephaloid generally. Always progressing rapidly, its growth seems active in proportion to the youth of the individual. The function of growth generally is much more active in early life than at any subsequent period; a fact which may not improbably account for the result noted. On the other hand, the appearance of the deposit in several organs, observed in adult age, may, perhaps, be regarded as an effect of the slower rate of progress manifested by the disease affording time for numerous local developments to occur.

The symptoms of the malignant affection are those common to prostatic obstruction of any form, but generally declaring themselves with greater rapidity than in the cases of senile hypertrophy. These need not be repeated. But besides them, there are other and distinctive characters, such as more severe pain, often very intense; occasional, often frequent, hæmorrhages; and more or less constitutional cachexia. The pain is felt in the rectum, or in the region of the sacrum, and shooting down the thighs, either the anterior or posterior aspect. In one case of my own, recorded here (No. VII.), the suffering experienced during the early and middle term of the complaint was very slight, apart from that produced by retention of urine, which occasionally happened, and was relieved by the catheter. During the last few months of his life the patient lost the powers of sensation and motion in the lower half of his body from encephaloid deposit in the upper part of the spinal column, otherwise doubtless his sufferings might have been severe. The prostate is not invariably tender to the touch in these cases, at least not notably so; an observation which is supported by the foregoing instance, before the paralysis supervened; and especially by another case very carefully watched by my friend Dr. Armitage, to whom I am indebted for the history forming Case No. VIII.

Hæmorrhage is a common occurrence both at an early and late period in the course of the disease, being almost universally present at one time or another, and sometimes to an alarming extent. The blood is usually voided almost pure or unmixed, and frequently appears with or after some attempt to urinate, which, from some circumstance, has been attended with greater exertion than usual. Much less commonly is the hæmorrhage observed to be continuous for any length of time, or constantly communicating a bloody tint to the urine, as happens with some tumors of the bladder; unless, indeed, that organ should also be implicated, or the disease have assumed the form of a fungoid growth into its cavity. Nor is the urine so liable to be mixed with pus or mucus as in the vesical affection.

The enlargement formed by the prostate itself, when examined by the rectum, is always hard at first, and may or may not be irregular in outline or consistence. Softening may in the later stages be felt, but the patient's powers do not always sustain him to so late a period as that in which the growth either softens or fungates. Consequently, on examination after death, the prostate may be simply enlarged; or there may be breach of surface and protrusion of soft granulations; or there may be loss of substance and a cavity, the last-named circumstance appearing to be rare. The deposit may affect the whole organ, and most commonly does so, but it may affect one portion more than another. Frequently, especially in the somewhat more chronic form of the disease which is met with in adults, as compared with that which affects children, other organs are affected, but by no means invariably. But there are *always* diseased lymphatic glands adjacent, and sometimes the infection reaches more distant groups. The existence of such swellings in the course of the iliac vessels, and sometimes in the inguinal region, may frequently be verified by examination of the abdomen, and constitutes a most valuable sign when present in relation to the diagnosis, and, consequently, to the prognosis of the case.

The urine should be closely examined, in cases of a doubtful nature, for the presence of cells which may be regarded as malignant, from inspection of their forms and constitution. Some observers state that they have verified cancer-cells in the urine. Others have failed to do so after close and repeated examinations. A good deal of débris may usually be seen in advanced cases, its presence appears to indicate that the growth has fungated, and throws off more or less of its elements in the condition of sloughy detritus. I have searched for characteristic forms of cancer-cell in the urine of malignant disease of the bladder, but unsuccessfully, and am not disposed to think that much reliance can be placed upon the appearance of the cells met with. The urinary passages yield epithelium cells of all forms and sizes abundantly, and these I suspect have been mistaken sometimes for the "cancer-cell." I remember a case in which a good observer diagnosed a cancerous tumor of the bladder from the discovery of what he considered undoubted cancer-cells, taken in connection with other signs. The patient died soon after with villous tumor, a form of disease miscalled cancer, and having no structural resemblance to the malignant affection. The presence of enlarged glands, the cachexia, and the history of the case, afford better means, I think, of establishing the diagnosis than any which are derived from the observation of the so-called cancer-cell in the urine.

Regarding the treatment of malignant disease of the prostate, nothing more can be offered here in relation to the constitutional affection than applies to it when occurring in any other part of the body. The treatment is palliative, and must be regulated according to the various necessities which may arise in the progress of the case.

Thus accumulation of urine must be provided against, at the smallest possible risk of irritating, much less of injuring the part. If catheterism can be dispensed with altogether, so much the better. In no circumstances is it of more importance to be extremely gentle in the manipulation of instruments. The pain must be relieved by anodynes administered both by mouth and rectum. The addition of conium to opium, by enema or suppository, is often particularly useful (see page 132); and by mouth belladonna is sometimes a valuable auxiliary in mitigating pain, given in doses of from one-fourth to three-fourths of a grain twice or three times a day. Hæmorrhage must be treated on principles already fully illustrated in a preceding chapter (page 133). The powers of life are to be supported by every means in our power. Nutritious food, both in the solid and fluid form, with a due proportion of alcoholic stimulant, must be supplied in accordance with the digestive powers of the patient.

Case No. VII.

J. A. Aged 60. Came under my care in the end of 1851, for frequent and difficult micturition. The cause of this was an obvious general enlargement of the prostate, not attended with tenderness on rectal examination. After a short time he was greatly relieved by the use of the catheter and medicines, and I lost sight of him. Subsequently he attended frequently at the St. Marylebone Dispensary that his bladder might be relieved. The urine was alkaline. He suffered little pain or inconvenience, except at periods when the retention became almost complete.

His symptoms becoming worse he was admitted to the St. Marylebone Infirmary, Dec. 9, 1853.

I then learned that he had gradually become paraplegic about one month previous to admission. He had now entire loss of motion and sensation as high as the hips, and soon after sensation disappeared up to the arm-pits. The fæces passed involuntarily, and the urine during sleep. There was no pain in the back; no history of any injury; nor were there any facial signs of cerebral lesion.

Under the employment of the catheter, &c., he improved at first slightly, but in Feb., 1854, the urine became bloody, contained much phosphatic deposit, and he died, greatly emaciated, on the 23rd.

P.M. The bladder was not large, somewhat thickened, and its mucous membrane was corrugated, exhibiting dark red and slatish tints, and adhering calculous matter. Several little nodules of a light colour, isolated from each other, were seen beneath it. The prostate was uniformly enlarged, and about the size of an orange.

The adjacent iliac glands were enlarged. The right kidney atrophied; its pelvis dilated, and containing three or four ounces of pus. The lower end of the corresponding ureter was completely obstructed by an enlarged gland pressing upon it. The left kidney enlarged, and containing a little calcareous deposit.

On removing the posterior arches of the spinal column, a flattened patch of encephaloid matter was found adhering to that of the first dorsal vertebra, and smaller portions were seen lower down. The cord itself exhibited no marks of change, except, perhaps, some undue injection of its substance. There was no cerebral lesion, nor was there any malignant tumor discovered in any other part of the body.

On making section of the prostate, the enlargement appeared to be mainly due to the displacement of the true prostatic tissue by deposit of matter, which, to the naked eye and microscopic examination, was obviously encephaloid. The same appearance was found in the glands, in the interspinal mass, and in the nodular deposits beneath the mucous membrane of the bladder. I exhibited this specimen at the Pathological Society, March, 1854.*

CASE No. VIII.

J. B. Aged 65. A sawyer by occupation. Enjoyed good health until one year and ten months before his death. He then began to suffer from pain in the sacral region, which gradually increased, but he did not give up work entirely until fourteen months before death. At that time he passed urine reported to have the "colour of elder wine," for some days.

May and June, 1856, he passed in St. George's Hospital. Soon after leaving, he voided a considerable quantity of blood by urethra during a period of six days. The total amount was estimated by himself at "not less than ten or twelve pints."

In July he twice passed blood, but in smaller quantity; and on two occasions since, slightly.

About the middle of September, he came under Dr. Armitage's care. His state at that time was as follows: "Complexion sallow; body emaciated. Complains of very severe pain in the region of the sacrum, and passing down the back of the thighs. Passes urine twice or three times in the night, rather more frequently in the day; occasionally with pain, when much ropy mucus is present and appears to block up the urethra.

Urine is generally alkaline, with more or less tenacious mucus and earthy phosphates; no blood.

A full-sized catheter being introduced encountered no opposition. The bladder did not completely empty itself, and the patient passed the instrument for himself twice a day for relief.

Examination by rectum verified the existence of a large and very hard tumor in the situation of the prostate, apparently about the size of a large duck's egg, but more prominent on the left than on the right side of the median line. Examination not painful; *no obvious tenderness on pressure.*

In the right inguinal region, there were several enlarged and hard glands, and on making deep pressure similar swellings were felt in the course of the iliac vessels. The same was observed, but to a less extent, on the left side.

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* Transactions, vol. v. p. 204, which see for further particulars, and a detailed report on it by Mr. Hutchinson.

These conditions altered very little before death, which occurred on the 17th of March, 1857. The patient had become a little jaundiced, more emaciated, and weaker. The glands exhibited no manifest change. The tumor continued much the same in size, and as hard as ever, until about a month before death, when it became much softer, especially on the left side.

Post-mortem examination. The prostate was found enlarged, and evidently the subject of malignant disease, as were the lymphatic glands described. No appearance of any similar disease in any other part of the body, which was closely examined. Dr. Armitage having kindly presented me with the prostate and adjacent parts in the fresh state, I carefully dissected it, and add the following notes made at the time.

Bladder enlarged, thickened and fasciculated; mucous lining shows marks of inflammation. Several small bodies, isolated and about the size of hemp-seed, are seen underlying the mucous membrane near its neck.

Between the orifice of the left ureter and the prostate is a mass of oblong form about the size of a large almond, evidently formed by some deposit in the muscular substance of the bladder.

The prostate is four times its natural size. The general outline is somewhat uneven, and slightly nodulated; the left lobe larger than the right. From its rectal surface, a soft fluctuating swelling extends backwards, nearly in the course of the left vesicula seminalis, which, on being opened, gave exit to yellowish fluid of a thick consistence, containing débris of tissues. The vesicula is much thickened, and loaded with deposit in its structure; the right vesicula also in a less degree. A section of the mass showed the tissues to be infiltrated with soft pale matter, from which a creamy juice abundantly exuded when pressure was applied. This under the microscope exhibited numerous nucleated and binucleated cells, large and small, characteristic of malignant growth; so also did the other deposits described.

CASE NO. IX.

MALIGNANT TUMOR FROM PROSTATE.

I. B. Aged 68. Had symptoms of diseased bladder five years. He suffered excessive pain in the back, bladder, and rectum, especially during the last six months of life. Rectal examination showed the prostate to be diseased; and catheterism was extremely difficult. There was at last very frequent and painful micturition, and on one occasion considerable hæmorrhage. He died comatose.

P.M. The right ureter had sloughed and given way, admitting a large quantity of urine to be effused beneath the peritoneum; "three pints of fluid being measured. The bladder was almost filled with a fungous tumor of loose coagulated blood, mixed with a white pulpy substance; which derived its origin from the back part of the prostate," and had plugged up both ureters as well as the urethra. There were several small masses of the same matter in the lungs and liver.—*Trans. of Med. Chir. Soc.* vol. viii. 1817, p. 279. By G. Langstaff, Esq.

Case No. X.

A man, aged 45, had suffered five years with symptoms of diseased bladder, from obstruction. His urine was loaded with mucus, and sometimes was tinged with blood. During the last six months of life he had voided pus and blood per anum.

At the post-mortem, the bladder was found to be contracted and hypertrophied. On opening it a large tumor was seen "produced by the prostate gland, which was converted into a fungoid and carcinomatous tumor resembling melanosis." The kidneys were inflamed. "The absorbent glands in the pelvis and abdomen were converted into medullary and carcinomatous matter, and the veins in the pelvis were filled with fungoid deposits." There was cancer of the stomach also.—*Catalogue of Preparations in the Museum of Geo. Langstaff, Esq.* Lond. 1842. p. 352.*

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* A man, aged 63, "had been afflicted with disease in the urinary organs and prostate for several years." The symptoms increased in severity considerably for some time before death. At the post-mortem the prostate gland was found to be "affected with melanosis and fungus hæmatodes, and the whole of the urethra is in a melanoid state." But nothing is said of deposit in the lymphatics, or in any other organ.—*Idem*, p. 330.

Three or four other cases are reported in the above catalogue as similar to the foregoing; but the accounts given are not sufficiently complete to place their nature beyond doubt, and they are, therefore, not included here.

CASE No. XI.

A gentleman, aged 59, in whose case Mr. Adams was consulted. Enlargement of the left lobe of the prostate was detected nearly at the outset; irritability of the bladder, and inability to empty the viscus, being the earliest symptoms. For the last year of life complete control over the bladder was regained. The main symptoms were, excessive pain in the lumbar and pelvic regions, and in the thighs and legs, with pain and swelling of the testicles. Duration of disease about three years and a quarter.

P.M. Prostate gland twice its usual size, the left lobe being occupied with a carcinomatous tubercle, right healthy. The adjacent glands much enlarged and similarly diseased, but no other abdominal viscera affected. Other cavities not examined.—*Adams on the Prostate*, 2nd edit. p. 149.

This case formed the substance of a communication to the Med. Chir. Soc., April 12, 1853, at which Mr. Adams stated that "the tumor had been examined by an experienced microscopist, who had pronounced it to be true schirrus in every particular."—*Lancet*, 1853, vol. i. p. 394.

CASE No. XII.

A gentleman, aged 67. Severe vesical irritation for a considerable time; no retention; urine occasionally bloody; pain excruciating. The left side of the prostate presented tumor of an irregular knotty hardness. Indurated glands appeared in the groin. The whole pelvis became filled with cancerous growths, which after death were found to have pushed up the bladder towards the umbilicus. The left iliac vein was obstructed by pressure, the left ureter also. The disease was nearly limited to the parts named.

A case related to the Hunterian Society by Mr. Cock, and quoted by Mr. Adams.—*Op. Cit.*, pp. 147-149.

CASE No. XIII.

C. F., aged 75, under the care of Mr. Ferguson. Duration of symptoms four years. He was admitted in a sinking condition, and died in the course of three days. P.M. The prostate was of the size of an orange; and both kidneys exhibited the presence of the same deposit: which in each instance was encephaloid.—*Lancet*, 1853, vol. i. p. 473.

CASE No. XIV.

A gentleman, aged 59, under the care of Mr. Haynes Walton. Duration of symptoms between eight and nine months only. Hæmorrhage occurred several times. The tumor was so large at a late period in its course "that the finger could not be passed between it and the sacrum."

P.M. "The true pelvis was entirely filled by a tumor" of an encephaloid character. There was a cavity in the diseased mass, "with irregularly-ulcerated walls, containing unhealthy pus; there was no trace of urethra, the bladder opened directly into it." The adjacent lymphatic glands were affected.—*Path. Trans.*, vol. ii. p. 287.

CASES No. XV. AND XVI.

B., aged 41, was an outpatient at St. Thomas's Hospital for some weeks with symptoms of stricture, with occasional retention of urine. Much disposition to bleed when catheters were passed. Subsequently, complete retention occurring, he was, on March 19, admitted to the hospital, under the care of Mr. Simon. Very sallow, not emaciated, bladder irritable, urine passed with effort; testicles swollen and tender. Rectal examination showed an enlarged prostate. He suffered much pain, but was relieved by occasional catheterism and opiates. In April he died from sloughing of the urethral aspect of the tumor, and consequent extravasation of urine.

P.M. "showed the prostate converted into an encephaloid mass the size of a small orange."

Mr. Simon adds, "The nature of the tumor had been fully recognized during life by the presence in the urine of granules and flocculi of animal matter, which under the microscope showed the large coherent nucleated cells of encephaloid cancer."—Lecture by Mr. Simon. *Lancet*, 1850, vol. i. p. 291.

Mr. Simon illustrates this case with a second. A man, aged 63, sallow and anxious. The chief symptom was irritability of bladder, which had existed more or less for about three years, with occasional bleeding during two years, and twice retention. No tumor in rectum. Flocculent matters passed, indicating the disease to be encephaloid. A few weeks after he died.

P.M. showed "an abundant growth of soft cancerous vegetations from the mucous membrane of the prostate." In both cases the neighbouring glands were enlarged.

Case No. XVII.

A man, aged 54, admitted under Civiale's care for calculus, 1837. Urine had long been thick, fœtid, and loaded with mucus: and the passing of it painful. Symptoms aggravated during last five months. On sounding a stone was detected, but his condition forbade any operative measures, and he soon died.

P.M. Large calculus in the bladder. A considerable tumor at the neck of the bladder reaching to the membranous portion of the urethra, where was a large excavation extending backwards from one and a half to two inches. The prostate was disorganized and softened at this part, whence by pressure escaped a cerebriform substance.

Reported as an illustration of cancer of the prostate.—*Civiale, Traitė Pratique, deux^e partie, Paris,* 1850, p. 503.

Case No. XVIII.

A man, aged 70, at Hôtel Dieu, May, 1839. Urinary symptoms had existed about eighteen months. Urine had been thick, loaded, and lately darkened by blood. Attempts at catheterism appear to have been unsuccessful. He gradually sank and died on the thirteenth day after admission.

P.M. Bladder contained urine, dark from blood; walls thick; mucous membrane slate-coloured. The prostate was the size of an ostrich's egg, and presented throughout, the tissue of softening encephaloid, with blood clots in it, a cavity containing one of these opened into the bladder. Encephaloid existed also at the lesser curve of the stomach. — By L. Aug. Mercier, *Recherches Anat. Path. &c., Paris,* 1841, p. 169.

Case No. XIX.

ENCEPHALOID DISEASE OF PROSTATE IN A CHILD.

W. M., aged 5 years. Mr. Stafford was called to see this child in the Marylebone Infirmary, on account of abdominal tumor, November,

1838. It reached two inches above the umbilicus, and proved to be a distended bladder, twenty-five ounces of urine being drawn off by the catheter. No pain was complained of; and no abdominal tenderness appears to have existed. Prostatic disease was not suspected, therefore no examination by rectum was made. Eight days afterwards he died.

P.M. All the viscera appeared to be healthy excepting the bladder and prostate; the kidneys were large. The mucous membrane of the bladder was thickened, in other respects the organ was sound. The prostate was equal in size to the largest walnut, was somewhat globular in form, and from its back part projected a tumor of the size of a small hazel-nut. Examination proved the mass to possess the "colour, consistence, and texture" of encephaloid; melanotic matter appearing to be intermixed.—*Trans. Med. Chir. Soc.*, vol. xxii. p. 218, 1839. By R. A. Stafford, Esq. Now forms Prep. No. 17, series xxix. *Mus. Barthol. Hosp.*

CASE No. XX.

A boy, aged 8, "had experienced for a considerable length of time great difficulty in voiding urine." He was sounded for suspected stone, after which there was much hæmorrhage; and subsequently swelling in the perineum, supposed to be abscess, which was punctured, but nothing escaped but blood, and soon after a fungous growth. At the post-mortem the prostate was found to "be converted into a medullary sarcoma." There were also "several fungoid tumors in the liver."—*Catalogue of Preps. in the Museum of Geo. Langstaff, Esq. London*, 1842, p. 357.

CASE No. XXI.

A child, aged 3, having been ill for some time, was observed to have difficulty in passing water, and subsequently retention. It was then brought to the London Hospital, and both catheterism and suprapubic puncture were resorted to, but without success. Death occurred shortly after, and the post-mortem revealed a "bladder distended with a large cancerous mass which had originated in the prostate gland and made its way into the bladder."—*Adams on the Prostate Gland*, 2nd ed., 1853, p. 145.

CASE No. XXII.

A child, aged 3. Symptoms of vesical disease during six months; then retention, relieved with difficulty by the catheter, which was frequently employed afterwards, until the obstruction rendered it impossible. Puncture of the bladder was performed above the pubes. About three or four weeks afterwards, the child died of exhaustion. On dissection the prostate was "enlarged to the size of a hen's egg, and completely transformed into medullary matter."—*By Professor Bush, in Gross on the Urinary Organs*, 2nd ed. p. 719.

CASE No. XXIII.

A child, aged 3, under the care of Mr. Solly. Among the earlier symptoms was retention of urine, which was relieved with some difficulty, nearly one and a half pint being withdrawn. The presence of stone was suspected. The child died of peritonitis three months after the first accession of the symptoms.

P.M. The prostate was enlarged by encephaloid deposit to the size of a hen's egg.—*Path. Trans.*, 1850–1, p. 130.

CASE No. XXIV.

A. C., aged 9 months, was placed under the care of Mr. Bree, of Stowmarket, March 9, 1843, for retention of urine of twenty-four hours' duration. A pint and a half of urine was removed by the catheter. A tumor was felt per rectum in the situation of the prostate. Obstruction increased, and ulceration took place through the sphincter ani in a few weeks. Death occurred April 22.

P.M. The bladder was highly inflamed and thickened, and the tumor proved to be a very large encephaloid growth from the prostate. Viscera generally healthy.—*Prov. Med. and Surg. Journal*, 1846, p. 76.

TABLE OF FOREGOING CASES OF MALIGNANT DISEASE OF PROSTATE.

Case No.		Age.	Duration.	Character.	Other Organs.
			ADULTS.		
7	Mr. Henry Thompson	60	2 years	Encephaloid	Spine and adjacent lymphatics.
8	Dr. Armitage	65	1½ "	Ditto	Lymphatics only.
9	Mr. Langstaff	68	5 "	Ditto	Lungs and liver.
10	Ditto.	45	5 "	Ditto with matter resembling melanotic deposit	Lymphatics and vessels adjacent; stomach also.
11	Mr. Adams	59	3¼ "	Reported schirrus	Adjacent lymphatics only.
12	Mr. Cock	67	Not stated	Probably encephaloid	Adjacent lymphatics.
13	Mr. Fergusson	75	4 years	Encephaloid	Both kidneys.
14	Mr. H. Walton	59	¾ "	Ditto	Adjacent lymphatics.
15	Mr. Simon	41	Some months	Ditto	Ditto.
16	Ditto	63	Rather more than 3 years	Ditto	Ditto.
17	M. Civiale	54	Not stated	Ditto	Not stated.
18	M. Mercier	70	1½ year	Ditto	Stomach.
			CHILDREN.		
19	Mr. Stafford	5	Few months	Encephaloid and melanotic	No other viscera.
20	Mr. Langstaff	8	" A considerable length of time"	Encephaloid	In liver also.
21	Mr. Adams	3	Not stated	Ditto	Not stated.
22	Prof. Bush	3	7 months	Ditto	Ditto.
23	Mr. Solly	3	3 "	Ditto	Other organs not examined.
24	Mr. Bree	9 ms.	About 3 months	Ditto	" Viscera generally healthy."

⁂ Other cases of malignant disease involving the prostate are reported in the journals and elsewhere, but are excluded for want of sufficient particulars by which to form a fair conclusion respecting them. At least 30 cases instead of 18 might have been adduced had I not been careful to reject those in which the evidence was incomplete.

CHAPTER XI.

TUBERCULAR DISEASE AND CYSTS OF THE PROSTATE.

TUBERCLE.—Rare in Prostate; almost invariably associated with Tuberculous Kidney or Testicle.—Diagnosis.—Treatment.—Form in which Tubercle is deposited.—Tabular View of fourteen Cases.—CYSTS OF THE PROSTATE.—Connection with Concretions.—No real Cystic Disease of Prostate.—HYDATIDS.—Almost always, if not invariably, situated, not in Prostate, but between Prostate or Bladder and Rectum.—Cases.

TUBERCLE OF THE PROSTATE.—The prostate is very rarely the seat of tubercular deposit, and when it is so, appears generally to be somewhat increased in size, until the later stages of the complaint are reached, when, after suppuration and discharge, its volume may become smaller than natural.

It would appear that at no period of the disease is the prostate affected alone, some other part of the genito-urinary track being the primary seat of the affection. In most cases the deposit appears to take place first in the kidney, or, at all events, to be present there in an early stage. The organ next in order of liability to the disease, among the genito-urinary group, is the testicle. Thus in fourteen cases collected by myself, and forming a table at the end of this section, in which the results of post-mortem inspections have been recorded, tuberculosis of the kidney is reported in eleven, and of the testicle in six. The state of the lungs has, I suspect, not always been recorded, but in seven of these cases they are stated to have been diseased.

From these circumstances it follows, that there are no symptoms which are, strictly speaking, proper to this affection of the prostate. Undue frequency and pain in making water, occasionally blood in the urine, and at times signs of cystitis, are commonly experienced. The complaint forms but a part of the development of tubercular disease in the genito-urinary organs as a whole. It is no part of the design of this work to embrace a consideration of the symptoms and diagnosis of tuberculous kidney; a subject, nevertheless, of great interest to the surgeon, to whom the disease is perhaps quite as often presented as to the physician, on account of the increased frequency of passing water, and other symptoms of stone or obstruction which accompany it. The presence of pus in the urine, of occasional hæmaturia, of pains in the loins, perineum, and penis, give rise to suspicions of calculus, to be resolved sometimes only by careful sounding. The state of nutrition of the patient, his history, and the condition of the lungs, are among the main points to be considered in connection with the urinary derangements, which have probably more especially attracted his attention.

Nothing need be said of the constitutional treatment of tubercular disease, and little in relation to the local manifestation in the prostate. Mechanical interference is to be avoided, and every kind of irritating application. If suppuration takes the form of external abscess, it must be treated as other perineal or ischiorectal abscesses. But more commonly the discharge of purulent and tubercular matter takes place into the urethra. The improvement of the health, by all those numerous means which regulation of the diet, regimen, exercise, climate, and medicine enable us commonly to achieve in tubercular patients, constitutes almost the whole of the treatment to be employed in the affection, when involving the urinary or genital organs. The diagnosis once established, it is of great importance that the patient should be kept free from all instrumental treatment, which, in such cases, provokes irritation, and aggravates the disease, without conferring upon him any benefit whatever.

The form which the deposited tubercle assumes in the prostate is, at first, that of minute yellowish points, like millet seeds. These become larger, and numerous rounded masses of cheesy or curd-like consistence may be found, distributed throughout the substance of the organ. Central softening takes place at an earlier or later period; and if the patient survives, discharge of the detritus takes place by urethra. A space remains; and several such coalesce and form a cavity of larger size; pus is formed from the lining membrane, and a considerable portion of the prostatic substance is destroyed. One of the forms of prostatic abscess may thus commence. But there is no reason to suppose, when such cavities are found in the prostate after death, that their origin has been tuberculous, unless the presence of such action or deposit can be distinctly verified in some other part of the urinary or genital organs. Prostatic abscess is much more commonly a result of simple inflammation, acute or chronic.

The following cases, fourteen in number, have been condensed into a tabular form. They constitute the greater portion of the data on which our knowledge of this disease is founded. The age of the patient, the condition of the prostate itself, and that of other organs of the body also tuberculous are presented. The sources from whence they are obtained are also added in a note.

CASES OF TUBERCLE IN THE PROSTATE.

Patient's Case.	Reported by.	Age.	Condition of Prostate.	Condition of other Organs.
1	Mr. Lloyd.	23	Enlarged cavity containing an ounce of scrofulous matter.	"The bladder and kidneys were tolerably healthy;" tuberculous cavities in the lungs.
2	Mr. Adams.	26	Disappeared by suppuration.	Tubercle in left kidney, ureter, and testicle.
3	Mr. Hudson.	—	Several small points of softened tubercle, and superficial ulceration.	Kidney largely tuberculous; ureter, lungs, bones, lymphatic glands.
4	Dr. Basham.	29	Granular deposits.	Right kidney and bladder chiefly affected.
5	Dr. Gross.	27	Eight small masses, each about the size of a pea.	One kidney, ureter, and vesicula semin.; spine and lymphatic glands (not in lungs).
6	Vidal de Cassis.	19	Tuberculous cavity.	Testicles and vesicula semin.; brain and lungs.
7	Ditto.	50	Large tuberculous masses.	Kidneys, lungs, &c.
8	Lallemand.	55	Thirty small abcesses and tubercles.	Both kidneys.
9	Ricord.	58	Large abscess in prostate.	Miliary tubercles throughout ureter; testicle previously removed for tubercular disease.
10	Guy's Hospital Museum.	23	Tubercular deposits, "size of pin's head to that of a nut."	Ulceration of bladder; much congestion of kidneys; tubercle in both lungs, and in lumbar vertebræ.
11	Bartholomew's Museum.	Young man.	Small circumscribed masses.	Tubercle in kidneys, lungs, and other organs; bladder ulcerated.
12	Ditto.	Do.	Large mass of tubercles in *left* lobe of prostate.	Tubercle in *left* kidney, *left* testicle; in lungs and other organs.
13	St. George's Hospital Museum.	35	Large tubercular cavity in prostate, capable of holding two ounces.	Kidneys extensively diseased; scrofulous abscesses in testicle, secondary to the prostate symptoms.
14	Mr. Simon mentions a case in which the entire genito-urinary tract was more or less affected with tubercular deposit, from the testicle to the prostate, and from the kidney to the same point.			

1. Lloyd on Scrofula. P. 110. 1821.
2. Adams on the Prostate. 2nd ed. p. 127.
3. Trans. Path. Soc. Vol. I. p. 120.
4. Lancet, 1855. Vol. II. p. 542.
5. Urinary Organs. 2nd ed. p. 721.
6. Annales de Chirurgie. 1845.
7. L' Union Médicale. 1850.
8. Des Pertes Sèminales. 1836. Vol. I.
9. L' Union Médicale. 1849.
10. Guy's Hospital Museum. No. 2393.75.
11 & 12. Barth. Museum. Series xxix.: 19 and 20.
13. St. George's Hosp. Museum. Series x.
14. Lancet, vol. i. 1850, p. 290.

CYSTS OF THE PROSTATE.—It is not at all uncommon, in making sections of an enlarged prostate, to find cavities, of a somewhat irregular form, in its substance, not met with in the normal organ. These cavities have all the appearance of being dilated follicles of the glandular structure. Ducts are easily traced into them; and frequently numerous little dark concretions lie free within. I have seen from thirty to fifty of these minute bodies occupying a cavity about the size of a grain of wheat or of a small pea.

But larger concretions, that is, of the size of pearl barley, small prostatic calculi, may occupy each a separate recess of its own; and on removing the foreign body, a spherical, thin, and smooth-walled cavity is displayed. Sometimes hundreds of such small cavities may be found in one prostate,—but this is a very rare circumstance. A good example may be found in the museum of the College of Surgeons, Prep. No. 2519.

The formation of these cavities, or cysts as they have been called, depends a good deal, I suspect, on the prior formation of concretions. At all events the two occurrences are closely associated. We know too little of either the one or the other to affirm anything very confidently respecting the precise mode of their formation. Most probably the cavities are nothing more than enlarged follicles, dilated cæcal terminations of the glandular tubes. We find no isolated cysts in the prostate filled with fluid, having no communication with the secreting structures around, as in the kidney; no formation indeed which can be regarded as analogous to that, which may be considered as the type of simple fluid cysts. Indeed, although I have, in conformity with the practice of other authors, referred to "cystic disease" of the prostate, it does not appear that the use of the term is warranted by the phenomena presented; and if retained, it must be held to signify a formation of a wholly different kind pressing against the back of the bladder, so as to divide it into two portions, of which the upper still contained two pints of urine, the lower, which held one, having been evacuated by the puncture.

In the Museum of St. Bartholomew's there is a good example of a large hydatid cyst occupying a position between the bladder and rectum. In this case the prostate does not appear to have been affected. It is preparation No. 15, series xxix.

It does not appear unlikely that Mr. Lowdell's case may have belonged to the same category, the prostate being more or less absorbed by pressure from an external cyst, so that the latter came at length to occupy the situation proper of that organ. The case is, however, given here in an abridged form.

CASE No. XXV.

HYDATID DISEASE OF PROSTATE.

J. I., aged 64, in Sussex County Hospital, in July, 1844, under the care of Mr. John Lawrence, jun. During three or four years had experienced difficulty in making water and frequent micturition; and of late, almost complete retention. The bladder was now emptied by catheter, after great difficulty, and three pints withdrawn. Much pus and mucus passed afterwards. He died in a few days.

P.M. Bladder very much thickened, and in the situation of the prostate was a tumor larger than a fœtal head, which, when cut open, proved to be a hydatid cyst, closely packed, the true substance of the prostate being lost in it. Hydatid tumors were also found in the omentum.

Whether the hydatid cyst was formed in the prostate itself, or external to the organ, destroying it by pressure alone, is stated to have been a matter of doubt. Appearances led Mr. Lowdell, who reports the case, to the former view. The facts of hydatid disease of the prostate being unrecorded, together with the existence of other tumors in the omentum, inclined him to believe that he "should be scarcely warranted in maintaining that opinion without question."—*Trans. Med. Chir. Soc.*, vol. xxix. p. 253. 1846. By George Lowdell, Esq.

CHAPTER XII.

THE BAR AT THE NECK OF THE BLADDER.

Close relation between this subject and Prostatic Enlargement.—Almost all Obstacles at the Neck of the Bladder are Prostatic.—A few cases which are exceptional.—Mr. Guthrie's recognition of them.—His Views defined.—Views of Civiale, Mercier, Gross, Leroy.—A Bar may be due to repeated Contractions of the Bladder from any cause whatever, if long continued.—Shown to consist, in such cases, of Muscular Hypertrophy.—Examples.—CONCLUSIONS on the whole subject.—Rarity of any Affection meriting the appellation of Bar in absence of Enlarged Prostate.—TREATMENT.—When due to Muscular Hypertrophy, as in Stone or Stricture, it will disappear on removal of the exciting cause.- Mr. Guthrie's proposal to divide Obstructions at the Neck of the Bladder.—Mercier's Modes and Instruments.—Results of Operations.—Consideration of these Proposals.

THIS is an affection so closely related to enlarged prostate, by identity of anatomical situation and of the symptoms resulting, that it is impossible to treat of one without also considering the other. As already seen, in the examination of the anatomy of the first-named affection presented in chapter the second, a bar at the neck of the bladder is very frequently due solely to enlargement of some part of the prostate; but it is not less a fact that a somewhat similar obstruction is sometimes, though not very commonly, present, when that organ is not the subject of disease. It is to this latter condition that the term, as designating a distinct affection, has been applied.

Although numerous forms of obstruction at the neck of the bladder have been frequently described, at some length, by the well-known French writers of the present century on urinary diseases, under the names of "bourrelets," "barrières urétro-vésicales," "brides," and "valvules," no specific distinction was recognized between the form of obstacle about to be described, and that which consists in enlarged prostate, until the late Mr. Guthrie called attention to the subject in his Lectures at the Royal College of Surgeons in 1830. He examined it with care, and arrived at more precise views respecting it than any previous writer had done, pointing out the distinctive characters of the two affections, the prostatic and the non-prostatic; and the term which he employed to designate the latter is retained here, in the sense which he originally intended it to convey. The views which he entertained respecting the entirely-distinct character of the two affections, are summed up briefly by himself, and may be given here in his own words. He concludes:—

"1. That an elastic structure exists at the neck of the bladder, and may be diseased without any necessary connection with the prostate gland.

"2. That the prostate may be diseased without any necessary connection with the elastic structure."

He quotes two cases, one in which, "without any affection of the prostate, and particularly of the third lobe, the patient passed his water with great difficulty, in consequence of the barrier formed by this unyielding structure, and died ultimately of the disease after much suffering." Another, in which, as a consequence of unequally-enlarged lateral lobes of the prostate, the right being most so, the mucous membrane of the neck of the bladder had been drawn up "so as to form a bar across its under part. This bar," he adds, "is quite membranous, and does not include the elastic structure which is not diseased, *neither is that part called the third lobe,* nor is there any projection into the bladder, save the bar or valve formed by its mucous membrane at the very meatus." *

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* On the Anatomy and Diseases of the Urinary and Sexual Organs; being the first part of the Lectures delivered in the Theatre of the Royal College of Surgeons, in 1830. By J. G. Guthrie. London, 1836. pp. 23 and 25.

In these two cases, as the author observes, one was exactly the reverse of the other. Each is, indeed, typical of two perfectly-distinct classes of abnormal conditions affecting the neck of the bladder. In the latter example there is presented merely a natural result of certain forms of prostatic enlargement which are occasionally met with, and some examples of which exist in our museums, in which the growth upward of some portions of the organ has the effect of drawing up the mucous membrane from the parts below, and sometimes with it some subjacent fibrous and muscular structures, but in which there is little or no enlargement of the posterior median portion (middle lobe) of the prostate itself. In the former case, there is an unnatural elevation of certain structures which underlie the mucous membrane at the posterior or vesical limit of the urethra, but which is unaccompanied by, and totally unconnected with, any enlargement of the prostate itself.

It is particularly necessary to draw the distinction clearly between the affection, to which Mr. Guthrie thus applied the name of "Bar at the neck of the bladder," and that obstruction which is constituted solely by an enlarged median portion of the prostate itself. Views differing very much from those which Mr. Guthrie held have been frequently promulgated as his respecting it. Thus the bar has been described by more than one author as an eminence situated just *behind* an enlarged middle lobe of the prostate. Now this is clearly not what was intended by Mr. Guthrie; nor can such an eminence be said to have for its locality "the neck of the bladder" at all, inasmuch as it must necessarily lie considerably posterior to it. As we shall see hereafter, the eminence so indicated is formed by a hypertrophied condition of those muscular bands which intervene between the two orifices of the ureters, and which are generally known as "the muscles of the ureters."

Civiale devotes a chapter to the consideration of this subject. He describes the "vesico-urethral barrier" as formed in some cases by "a simple fold of membrane, smooth and thin, and almost transparent, extending from one lobe of the prostate to the opposite;" and in others by a fold, thicker, in the form of a rounded cord, which contains some fibrous or muscular tissue.* In others it partakes more or less of prostatic substance. And, he adds, that a considerable barrier may be found after death, when no symptoms have existed during life, while in other cases a train of very painful disorders of the urinary apparatus may result from an inconsiderable membranous fold, giving rise, however, to very decided obstruction at the vesical neck.

He also reviews the alleged causes of these valvular obstructions, that is, when not due to enlarged prostate; viz. spasmodic muscular contractions, rheumatism, &c., and expresses his opinion that we have no certain knowledge of the etiology of the affection.

Mercier, who is familiar with Mr. Guthrie's views on this subject, but does not altogether coincide with them, describes, as the usual form of urethro-vesical barrier, a "semi-annular eminence, very like the pyloric valve of the stomach, if it existed only on the lower half of the orifice." On dividing these, he finds them "formed of a greyish white tissue, sometimes bluish, and only about seven or eight millimetres below, comes the prostatic tissue."† The seat of the affection he states to be the tissue at the apex of the trigone, between the mucous membrane and the prostate. The cause of it, he suggests, may probably be found in a previous attack of inflammation of the neck of the bladder, following generally gonorrhœa, sometimes due to other causes; and he refers to the fact that undue sensibility of the vesical neck is sometimes observed in relation with these circumstances. Moreover, he thinks that he has been able to verify the theory by experience, citing cases, but at the same time admitting that more precise information is wanting respecting them.

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* Traité Pratique, vol. ii. p. 244.

† Recherches, p. 376.

Dr. Gross, of Louisville, has devoted a few pages to a consideration of the "bar-like ridge of the neck of the bladder." From his observations, and from a drawing which he gives of that bar, it is obvious that he does not identify by that term the pathological condition described by Mr. Guthrie.* For indeed not only does he refer it to a different locality, but enumerates, as one of its most frequent causes, hypertrophy of the prostate. Whereas, as has been already shown, the term was assigned by Mr. Guthrie to an obstruction situated at the neck of the bladder, across the urethro-vesical meatus, and only when enlargement of the median portion of the prostate (middle lobe) is not present.

Mr. Leroy D'Etiolles appears not to recognize clearly the occurrence of valvular obstruction at the vesical neck, except when produced by prostatic enlargement. To this very common form of disease he has given considerable attention, treating of it in various papers in the French journals, and in his own published works, during nearly thirty years past.

The second form of bar described by Mr. Guthrie, and recognized by all authors, viz. that which is formed by the drawing up of the mucous membrane and sub-mucous tissues by the upward development of the adjacent lateral lobes of the prostate, can, of course, only be seen in those cases where enlargement affects these, but not the posterior median portion, or, at all events, not to a considerable extent. Examples of this kind are by no means common, for a tendency to the formation of outgrowth seems to be more uniformly manifested in the posterior median portion, than in any other part of the prostate. Consequently, I cannot look upon this as a common, but, on the contrary, only as an unfrequent, affection.* And if we may be guided by the contents of our museums, the former kind, viz. that in which a crescentic fold of mucous membrane obstructs the posterior moiety of the urethro-vesical meatus, no prostatic enlargement, stricture, or vesical disease being present, is still more rare.† It is true that the apparent deviation may be sometimes so slight in such instances, that preparations exhibiting little to catch the eye may not have been deemed worthy of preservation. Nevertheless, although I have occasionally seen an example of the kind here described, it has been so unfrequently, that I cannot do otherwise than regard it also as extremely exceptional, notwithstanding that Mr. Guthrie has expressed himself to the contrary. I am persuaded, after careful and repeated examinations, that unnatural elevations at the neck of the bladder are more frequently caused by some enlargement or outgrowth, however small (and they may be seen in all degrees of development), springing from the posterior part of the prostate; and that such are not mere elevations of the mucous and sub-mucous structures only, but are commonly formed by genuine prostatic enlargements, united with the main body of the organ by proper ducts, not difficult to be traced.

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* In the drawing referred to, the orifices of the ureters are situated one on each extremity of *the bar itself*, which is evidently the muscular ridge (muscles of the ureters, *Bell*), so often seen, extending between those orifices when the bladder is hypertrophied under circumstances of difficult micturition. If additional proof of this were wanting, it would be found in the description which follows the drawing, from which it appears that great prostatic enlargement was present; and that "the third lobe of the prostate, which is itself singularly enlarged and disfigured," * * * "formed a rounded prominent mass, which projected into the interior of the bladder, and *overhung the bar*."—*The Diseases, Injuries, and Malformations of the Urinary Bladder, &c.* By S. D. Gross, M.D. 2nd ed. Philadelphia, 1855, p. 236.

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* Two examples exist in the Museum of the Royal College of Surgeons, in which a very marked barrier exists at the neck of the bladder, *made up chiefly of mucous and submucous tissue*, in connection with prostatic enlargement: viz. Nos. 2489 and 2490.

† There is only one example of this in the Royal College of Surgeons' Museum. It bears Mr. Guthrie's name upon it, but is not numbered in the catalogue. It is evidently an example of the kind, and one, I believe, upon which he set a great value as demonstrating the existence of this affection. See Op. Cit. p. 23.

In such cases the small prominence rising in the centre of the floor of the vesico-urethral orifice elevates a little crescentic fold of membrane on each side, and often, whatever magnitude the glandular growth subsequently attains, these membranous folds still rise with it. It is through such a fold that the point of the catheter has been sometimes forced in performing perforation to relieve retention of urine, in which case, of course, the minimum of injury is inflicted on the parts; and could such a result be always anticipated from that operation, it would be the simplest and least dangerous proceeding for relieving prostatic retention, beyond all question.*

But while such is the character of the commoner forms which obstructions at this spot assume, there is, undoubtedly, another, by no means unfrequently met with, wholly distinct from the foregoing, the nature of which has not, I think, been hitherto satisfactorily explained. In observing a specimen of the kind referred to, that which meets the eye is as follows:—the uvula vesicæ is unduly elevated and developed, into a transverse ridge of varied size; there is a considerable decrease in the antero-posterior diameter of the floor of the bladder, or trigone, and the muscular bands which define that space are hypertrophied, as is also the structure of the bladder generally. Further examination shows an absence of enlargement of the prostate, but usually either brings to light a stricture of the urethra, or it is ascertained that the patient was the subject of calculus or of some other cause of long-existing irritability in that viscus. In short, in a number of preparations of the urinary organs in which urethral obstruction has existed many years during life, the floor of the bladder presents the appearance of having been shortened or compressed from before backwards; the orifices of the ureters have approached very much nearer to the neck of the bladder than their normal situation, and the muscular eminence, which unites them, is unduly developed; while the uvula, or the structures occupying its situation, appear also to have become more salient, and to project unnaturally, so as to form a thick rounded prominence across the posterior part of the neck of the bladder, very different in character from a thin or membranous bar. On making a vertical section of the neck of the bladder and prostate, this elevation is seen to be due to an augmentation of the natural constituents composing the uvula, that is, of fibrous and muscular elements, while the prostate, as before said, is in no way increased in size. Now this condition of parts was examined by Sir Charles Bell, and formed the subject of a paper published in the Transactions of the Medical and Chirurgical Society, vol. iii. 1812, entitled "An Account of the Muscles of the Ureters, and their Effects in the Irritable States of the Bladder."

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* Preparation No. 2513, in the Museum of the Royal College of Surgeons shows well a case in which the perforation was done with precisely the result described. The patient lived five years afterwards. The Museum contains six other examples of this operation.

He there demonstrated his views of the arrangement of those large bundles of muscular fibre which appear to be connected with the occluding of the orifices of the ureters, and with the opening of the neck of the bladder. These are greatly hypertrophied when increased action of the bladder has been long kept up by some source of irritation, and the result is that an approximation of the vesical neck to the orifices of the ureters takes place. But Sir Charles Bell stated that it was the "middle lobe of the prostate," to which this muscular apparatus was attached, and he suggested that the undue development of that lobe was, in all cases, mainly due to their mechanical action, drawing upon it, bringing it into its unnatural position, as it were, by repeated efforts; and by the irritation in it thus produced causing its hypertrophy. This theory gave too much prominence to the mere mechanical action described, which is obviously inadequate to give rise to the phenomena it was presumed to account for. At the same time, it made no advance towards the discovery of a primary cause for the prostatic enlargement, inasmuch as no explanation was offered of that which determined the muscles to act in this abnormal manner upon some prostates, and not upon others. But further, an examination of the preparations in our museums demonstrates that the development of the "muscles of the ureters" does not by any means necessarily co-exist with enlargement of the posterior median portion of the prostate; but shows that it occurs when extraordinary contractions of the bladder have been long habitual, *whatever* may have been the nature of the obstruction which has called them into play; and that the appearance of the prostatic enlargement itself, rising, as it often does into the bladder in a polypoid form, with a pedicle at its base, does not indicate that it has been drawn into its position, or in any way produced by muscular action. Furthermore, the best examples of the hypertrophied muscular apparatus in question, and of the elevation at the neck of the bladder associated with it, are found in connection with long-standing stricture of the urethra, and not in cases of prostatic enlargement.

But the muscular bundles in question, it is now well understood, are not inserted, in the manner described, into any portion of the prostate; but are disposed in the following manner. Having united with the submucous layer of the bladder, they continue onwards to the vesical orifice, those of each side crossing each other there, and forming "the uvula;" they then become continuous with the longitudinal muscular coat of the urethra. This is clearly shown by Professor Ellis of University College, who has elaborately dissected and described the arrangement of muscular fibres throughout the genito-urinary apparatus.* A hypertrophied condition of these muscular bands, which associate the ureters with the urethra, and constitute the uvula, results from frequent and long-continued expulsive efforts of the bladder; they appear to be very closely identified with the action of the outlet, and their enlargement, thickening, and undue prominence, is the natural consequence of hyper-activity. Such I believe to be the true pathology of an obstruction at the neck of the bladder, when it is neither formed by development of the prostate itself (the posterior median portion); nor by a simple fold of mucous membrane drawn up by the lateral lobes; nor, as very rarely happens, by some abnormal development of the fibrous tissues there, in the absence of vesical irritation, and apart from any ascertainable cause of production.

It should be added that this appearance may be the only thing found sometimes after death, when no cause for urinary symptoms, which may have been severe during life, was discovered. It is not necessary to suppose, as Mr. Guthrie suggested, that the bar had, even in such a case, been the source of those symptoms. Its existence simply proves that there has long been an undue amount of expulsive effort on the part of the bladder. It is itself but the result of that activity expressed in the form of hypertrophy; and the cause of the undue action which produced the bar has still to be sought. That there are cases of

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* An Account of the Arrangement of the Muscular Substance in the Urinary and certain of the Generative Organs of the Human Body. By G. V. Ellis, Professor of Anatomy in University College, London.—*Medico-Chirurgical Transactions*, vol. xxxix. p. 327.

"irritable bladder," as it is termed, in which neither stricture, enlarged prostate, calculus, disease of the kidney, or of the rectum, or other satisfactorily-ascertained cause are present, is a matter of experience, although rare, it is true, to most surgeons. In such, if the symptoms have been severe and long continued, we shall, undoubtedly, find, *as their result*, a state of the muscular coats of the bladder, which, in a degree more or less marked, presents the projecting bar at its neck, but we must search more deeply for the cause which produced the irritable bladder, and look upon the anatomical change as its consequence. Doubtless long-existing idiopathic chronic cystitis, which is not occasioned by any of the causes above named, or by other such local sources of irritation, will likewise produce it, through the extreme irritability of the bladder so occasioned.

It is the presence of this bar in old cases of stricture, which, besides the enlarged lacunæ in the dilated urethra behind it, appears to be sometimes the cause of obstruction at the neck of the bladder, long after the instrument has passed the stricture; and which may occasionally cause some difficulty in drawing off the urine by the catheter. It appears to account also for the statement, often made, that a patient with strictured urethra has enlarged prostate also, a concurrence of circumstances less common than might otherwise be supposed.

As this subject has been regarded in a manner which differs in some respects from that which has been followed by other writers, some examples of this form of bar will be referred to below, consisting in hypertrophy of the tissues at the neck of the bladder, arising from long-continued hyperactivity of the expulsive function, and generally as the result of stricture of the urethra.*

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* ROYAL COLLEGE OF SURGEONS' MUSEUM.—Examples of thickening of the structures at the neck of the bladder, forming a bar, apparently due to hyper-

In order to conduce to the object of affording a clear exposition of the facts brought forward in relation to this subject, and of the views which have been founded upon them, I shall sum up with a brief statement in the form of conclusions.

It appears:

First,—That in the great majority of cases in which there exists an organic obstruction, having more or less the form of a ridge or barrier, situated at the posterior border of the neck of the bladder, this unnatural elevation is constituted by an outgrowth arising from the posterior median portion ("middle lobe") of the prostate.

Secondly,—That an organic obstruction may exist at the neck of the bladder, when there is no enlargement of the posterior median portion of the prostate.

Thirdly,—That in this case it most commonly consists of an undue elevation of the uvula, associated with hypertrophy of the muscular elements of the bladder, particularly of the muscles leading from the orifices of the ureters to the urethra—originating in long-continued irritability of the viscus, and generally occasioned by stricture of the urethra, or calculus of the bladder.

Fourthly,—That much less commonly it consists of a fold of mucous membrane and submucous tissue drawn upwards by enlarged lateral lobes of the prostate, the posterior median portion being slightly, if at all, affected.

trophy of muscles controlling this orifice, are found in Preparations Nos. 2545, 2550, 2572, and 2567, the last named being the most striking one.

University College Museum. (No. 482.)—A marked example of bar; prostatic urethra dilated behind a stricture at the bulb.

In Guy's Hospital Museum.—A good example may be seen (No. 2399) of valvular fold of mucous membrane only, forming a thin, sharp, and prominent bar at the neck of the bladder. The urethra passing through the prostate is dilated behind a stricture at the bulb. Nos. 2405 and 2406 exhibit bars at the neck of the bladder, coexistent with stricture.

In none of the foregoing is the bar prostatic in its nature.

Fifthly,—That, very rarely, such a barrier exists in the absence of any known cause for its formation, in which case it appears to consist, as in the preceding, of a simple elevation or fold of the tissues which form the posterior border of the urethro-vesical orifice, no enlargement of the prostate being present.

The two distinct conditions, described in the last two paragraphs, are those to which Mr. Guthrie applied the term "bar at the neck of the bladder," and which he employed in order to distinguish them from the well-known elevation there caused by enlarged "middle lobe," from which they are perfectly distinct, and with which it is obvious they cannot co-exist.

The foregoing conclusions show how rarely we have to encounter any affection meriting the appellation of Bar at the neck of the bladder, as distinguished from prostatic enlargement affecting that part, or from the condition described as coincident with vesical hypertrophy resulting from stricture or calculus. In entering upon the subject of treatment this is to be borne in mind, and it may further be premised that the surgical proceedings described for its relief are equally applicable to any form of prostatic enlargement forming a barrier at the vesical neck, from which it is rarely possible, during life, confidently to diagnose the veritable or non-prostatic bar.

TREATMENT OF THE BAR AT THE NECK OF THE BLADDER.—It is obvious that when obstruction at the neck of the bladder consists only in a hypertrophied condition of the muscular apparatus described, produced by the irritation accompanying stone, stricture, or other source of continued, frequent, and painful micturition, no other treatment is necessary, or will be of any service, which does not remove the exciting cause. There is, indeed, no utility in regarding it separately from that cause; any more than exists for separately treating a hypertrophied or a dilated bladder, or an enlarged ureter, or any other consequence of urethral obstruction or vesical irritation. Remove the cause, and all these secondary evils will diminish or disappear. But the case is different when a barrier exists apart from the circumstances enumerated. Such, not being prostatic in its nature, has been already stated to be extremely rare, and its exact diagnosis probably not always possible during life, the purely membranous or fibrous barriers not being always distinguishable from those which are really prostatic in their origin. Still supposing that it were possible, let me repeat that there is no indication whatever for any method of treatment differing from that adapted to the ordinary varieties of prostatic obstruction at the vesical neck. It remains therefore here only to consider what has been done, and what may be repeated, in the shape of operative procedure, in order to remove or diminish such obstacles, the crisis of retention not being present, this subject having been already fully discussed in the eighth chapter.

Suppose, then, a case in which has been verified the presence of a considerable obstruction at the neck of the bladder, constituted either by the very common affection of enlarged median portion of the prostate (middle lobe), or of the very uncommon one of hypertrophy of submucous tissue, no such prostatic enlargement being present; and that this barrier, whatever its structure, is the cause of grave difficulties in micturition—the absence of calculus, stricture, vesical tumor, or other such source, being absolutely excluded—can operative measures be expected to supply any relief to the patient?

The late Mr. Guthrie, to whose experience, as the first to call attention to the subject, we naturally turn, says, that the treatment by simple dilatation and by permitting the catheter to remain permanently in the bladder, although often useful, does not always succeed, in which case he adds, "the bar, or dam, at the neck of the bladder must be divided, and the question is, how is it to be done with the greatest safety?"* After discussing the propriety of following the example of Sir Wm. Blizard, who, in a few instances, practised incisions resembling those made in lateral lithotomy for the purpose of affording relief in very confirmed and advanced enlargement of the prostate, Mr. Guthrie suggests that a simple bar may easily be divided, and mentions two instances in which he had so acted with advantage. In these he employed a modification of one of Mr. Stafford's stricture instruments, consisting of a prostatic catheter, containing a blade which was easily projected from the side of the instrument at its extremity, after this had been passed into the bladder, so as to make an incision in the act of withdrawing it; or two incisions might be made, one during the act of entering, and the second as just described. He also intimates his belief that in some cases much relief would be obtained by making an incision in the median line of the perineum into the membranous part of the urethra, and thence dividing the prostate, together with the bar or any other form of obstruction which might exist. This, Mr. Guthrie adds, he has not yet put in practice. The operations thus initiated seem to have fallen into disuse—or rather perhaps it would be more correct to say that they never came into general practice in this country; but similar proceedings were adopted in Paris about the same time; M. Leroy D'Etiolles having addressed the Academy of Sciences (1832-3) for the purpose of advocating scarifications and incisions of obstructions situated at the neck of the bladder. The instrument which he subsequently employed, which was exhibited to the Academy in 1837, and was figured,

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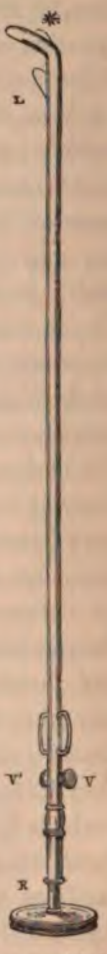
* Op. Cit. p. 274.

I believe, for the first time in 1840, resembled very much that just described, excepting that the blade could be projected from either the convexity or the concavity of the curve, this latter being extremely small, like that of the exploring sound exhibited at page 99. Besides this, however, there was another blade, which was intended to act against the original one, like the blades of a pair of scissors, and to serve the purpose of excising a small outgrowth when necessary.*

Fig. 18.



M. Mercier has also advocated and practised a similar procedure, and employed instruments of a similar character, with some slight modification. The annexed figure (18) is taken from M. Mercier's work, as the most recent publication on the subject, and as therefore describing the latest mode of practice.† It consists of a silver canula, having the form of his exploring instrument, containing a blade, cutting from either the convex or concave aspect of the curve of the canula, as already described. When the blade is sheathed, the instrument is employed as a sound, and being introduced into the bladder, previously injected with a few ounces of water, the beak is turned downwards, as in sounding behind the prostate. By means of the screw at v', an adjustment is made, which regulates the distance to which the blade is permitted to slide out of the beak and along the shaft; in the figure that distance is indicated by the letter L. By drawing the circular handle R towards himself, the operator, therefore, makes an incision of the bar against which the beak rests, dividing the tissues more or less perfectly between it and the point L. To ensure complete division, the blade is pushed back again into the beak, and this process may be repeated if necessary. The instrument may also be used in front of the prostate, or an incomplete incision made from within the bladder, in the manner just described, may be completed by placing the beak, directed upwards, in front of the bar, and making the knife project from the canula on its convex aspect, as seen in the figure, and indicated by the asterisk. In this case the screw v' is first turned in order to regulate the movement. In this manner Incision is performed; the method recommended by M. Mercier, where the bar is narrow, or thin and prominent. But if it is rounded and wide, as most prostatic enlargements in this situation are, he practises Excision by means of an instrument somewhat similar to a lithotrite (fig. 19.), by which, the beak being turned downwards, he seizes a portion between the blades of the instrument, fixes the yielding tissue by means of an arrow-headed needle, seen in the figure, which renders it immovable, then closes the blades, and in so doing excises the portion contained. This, being fixed by the needle aforesaid, is removed when the instrument is drawn out. Frequently some bleeding, generally a good deal, appears to follow this process; sometimes it has occurred to a dangerous extent. This is treated by small injections of cold water, by elevating the pelvis above the level of the head, and by internal astringents. After the operation, the patient is desired, in the surgeon's presence, to empty the bladder of the water

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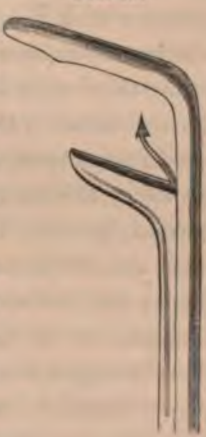
* Compte-Rendus des Seances, vol. iv. p. 551.

† Recherches, &c. Par A. Mercier. Paris, 1856. p. 216.

Fig. 19.



injected previously. It is important, says the author, that he should do this while lying on his side, and without effort. If it does not flow, a full-sized catheter, with large eyes, should be passed. A catheter should not be left lying in the canal, as it provokes spasm, and repeated desires to pass water, and so favours bleeding. It is better to pass an instrument from time to time when the patient feels the desire to urinate. After some extended remarks upon the subject of hæmorrhage, M. Mercier says, "It is at present the only serious accident which I have observed to result. I repeat boldly, by the aid of the means indicated, I have never failed to overcome it, and my experience rests on a sufficiently extensive base, since my operations have reached the number of 300, some of my patients having been operated upon several times."* About six days after the operation he passes a solid catheter with great care lest hæmorrhage be excited, and, according to circumstances, soon after makes pressure with it upon the seat of the wound by way of preventing union, increasing the force employed from the second to the third week following the operation. He speaks in very decided terms of the benefits which have followed the practice in numerous cases, citing the reports of fifteen in illustration. The names and residences of these patients are appended, in most the operation was performed in presence of some one or more of the most distinguished surgeons of Paris; and in five cases the patients were examined by the Commission of the Argenteuil prize. The reports are therefore open to correction if any undue partiality for the proceeding has been manifested by the author. Of these, two died; one of dysentery, one of "fever." Both appear to have been in extremely bad health, and their antecedents would, in London, have been held by most surgeons to contraindicate the performance of any operation not absolutely necessary. In five cases, in which the urinary difficulties, such as habitual retention and dysury had been considerable, complete relief was afforded, and had been verified as continuing in one case during four years, in another two years. Seven were improved in various degrees; some very considerably, these were reported by the author as cases of cure. In one, no alteration was produced by the operation. Such are the results, judging from a perusal of these fifteen histories.* We have no means of knowing whether these form an average sample of the author's experience, as he states this to be but a small portion of it in a passage just quoted. That it is not a selection of the best cases is evident from the fact that non-success in one and death in two instances have been reported. These might have been suppressed, and the twelve remaining cases would have produced a widely-different impression respecting the proceeding. It is fair, then, I think, to look upon this as a tolerably-average specimen of the practice. The total result cannot be regarded as encouraging. At the same time, with care to avoid constitutions which are obviously bad, or the subjects of advanced renal disease, I can conceive that there are cases in which Mr. Guthrie's original proposal of incision, as thus carried out, might be advantageously put in practice, and I have been the more induced to enter upon its consideration on account of the recognition by that distinguished surgeon of the existing necessity for some mode of overcoming the obstructions in question. Such a proceeding should be employed by none but those who have been thoroughly familiarized by the use of instruments in the urethra and bladder, and then much caution and judgment must be exercised in the selection of suitable cases. For my own part I should desire to be fully assured first that dilatation was unequal to affording considerable relief; this is a method which has yet to be fairly and effectively employed in these cases, both in this country and in France. It is true that the surgeons of the latter country have tried various forms of metallic dilator for the neck of the bladder, but their experience of the irritation so occasioned has brought them into disuse, as might indeed have been expected. But the application of expanding air or water pressure, equal in every direction, and gently increased from time to time, affords a method much more promising, and which it is possible may render the employment of the cutting apparatus just described almost, if not altogether, unnecessary; and it is a conviction that it may prove a useful, and at the same time a less hazardous, mode of treatment, which has led me to make trial of it in the manner described in the seventh chapter.

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* Op. Cit. p. 240.

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* M. Blandin, lecturing on a case of retention of urine from bar at the neck of the bladder, at the Hôtel Dieu, speaks highly of Mercier's method by incision, which he prefers to excision, as more certain and equally efficacious. —*Gaz. des Hopitaux*. Jan. 23, 1849.

CHAPTER XIII.

PROSTATIC CONCRETIONS AND CALCULI.

PROSTATIC CONCRETIONS. — Distinct from Calculi. — Physical Characters to naked Eye and Microscope.—Chemical Characters.—Analysis.—Are they natural or abnormal Formations?—Mode of Formation, and History.—May become Nuclei for Calculous Matter. — Analysis between Prostatic and Biliary Concretions — and other Concretions.—Views of Dr. Jones and Mr. Quekett; Virchow, Wedl. — PROSTATIC CALCULI. — Different kinds, sizes, &c.—Analyses.—Situation.—Numerous Examples.—Operative Measures for Removal.

IT is exceedingly common, when a urethra has been laid open, to observe in its prostatic part, lying around the veru-montanum, and in the orifices of the prostatic ducts especially, numerous little brownish or blackish bodies, the largest of which ordinarily met with are about the size of poppy-seeds. They do not lie free in the canal, but generally just within some of the orifices alluded to, sometimes beneath the epithelial layer of the mucous membrane of the urethra, barely visible over them. Again, when a section of the prostatic substance is made, especially if the knife be directed backwards and outwards on either side of the veru-montanum, many of the same bodies may be frequently seen. Indeed they may be dispersed through all parts of the organ, although they rarely attain the size named in situations very remote from the urethra.

These bodies have received the name of Prostatic Concretions. They have in their origin no relation to urinary calculi; nor should they be confounded with the hard, white, porcelain-like masses which are sometimes met with in the prostate, and from which they differ also. It is the more necessary to draw the distinction, as the concretions have not unfrequently been spoken of as urinary calculi, and still oftener are viewed as having a similar constitution, and as not being generically distinct. They will therefore be considered here separately.

Prostatic Concretions.—The bodies described above under this term are not generally observed before middle or advanced age. But although, as a rule, to which there are occasional exceptions, no examples visible to the naked eye can be detected during the periods of youth and early manhood, the microscope reveals them of very small size at all ages, except that before puberty. In the series of fifty prostates examined by myself, they were present *in every instance.*

In the early stages of formation, they present very beautiful microscopic objects, varying in size, for the most part, from about the one-thousandth to the one-hundredth of an inch; generally oval in form, sometimes angular, and then apparently from the result of mutual pressure. They have a yellowish hue, varying between the faintest tint and a deep orange, evidently acquiring intensity of colour with age or increase in size. They have a well-defined outline, as if limited by some kind of cell-wall, and exhibit numerous concentric rings in their interior, which, although the object is more or less translucent, suggests strongly to the observer the appearance of a uric acid calculus when cut (Plate IV.); a resemblance which no doubt originally suggested a relationship with formations of that class. The central part, or nucleus, as it has been termed, does not usually exhibit these rings, but has a cellular appearance, as if constituted by a conglomeration of corpuscles partially fused together (Plate IV. *f*). This central mass varies in size, but is usually present; and around this it is that the concentric circles are placed. Often two, three, or more, of very small concretions are seen lying closely together, each possessing more or less angularity, and forming the nucleus of a larger formation (Plate IV. *e h*). Occasionally lines are seen radiating from the nucleus to the circumference (*d*): sometimes cleavage of the mass takes place in the direction of these lines. Sometimes the concretion appears to consist almost entirely of the agglomerated corpuscles; at others these exist in very small relative proportion to the concentric rings, in which latter no trace of corpuscular arrangement can be detected. It is easy, when examining a considerable number, to trace a series of these small semi-transparent bodies, as it were in different stages, until they gradually become the dark, almost opaque, forms at first described. Even in the latter some remains of the concentric arrangement may be occasionally observed, but, generally speaking, they are too dark and opaque to transmit light, and only appear as dark brown masses of spheroidal form, with enough of translucency to enable the eye to detect easily at their edges that they have really a deep orange or red colour. In consistency they have also considerably changed. In the early stages these bodies are soft, and readily cleave or divide as a soft body does under superincumbent pressure, even when as large as the one-hundredth of an inch, by the application of a very little weight to the thin glass which covers the object under the microscope. But when they have arrived at the size and colour above described, they have acquired also considerable solidity, are firm, and even brittle when force is applied to break them.

Their chemical reactions are peculiar. The small, soft, pale and yellow bodies are not acted on by acetic, nitric, hydrochloric, or sulphuric acids cold; nor by sulphuric ether, liquor-potassæ or ammoniæ. The larger, hard, and brownish concretions I have found to be unaltered by the addition of alkalies, except that they occasionally become rather more translucent. By hydrochloric and nitric acids they are sometimes influenced, giving off a few bubbles of gas, and slightly diminishing in size. Sulphuric acid liberates gas more rapidly, and sometimes after they have ceased to be affected by the former acids. Occasionally they become soft, and disintegrate into amorphous matter, losing very little of their colour or bulk, by immersion in sulphuric acid. On the other hand, some specimens appear to be very little affected by any reagent.

In order to obtain an exact qualitative and quantitative analysis of these bodies, I submitted about 200 of the hard dark-coloured concretions to my friend, Dr. William S. Squire, who, after a careful investigation, has furnished me with the following report.

"Immersed in acetic acid the concretion resists its action, but if broken before this agent is applied, it becomes slightly softened and swollen. Nitric acid, cold, has no effect; when hot it dissolves the concretion entirely, producing a very slight yellow tint. A portion of the concretion treated with a solution of iodine, does not change colour. Sulphuric acid and sugar do not produce any effect characteristic of protein. When treated with a solution of potash, hot or cold, there is no change, and on adding an acid, no precipitate is formed in the alkaline liquid. When the concretion is heated, a strong ammoniacal odour is evolved.

"From these reactions, I conclude that the organic constituent of the concretion is not a true protein body, but most probably belongs to that class of nitrogenized substances, sometimes termed protein derivatives, of which fibroin, gelatin, and chitin, are examples.

"The following results were obtained by incineration:—

Concretions ·0244 gramme.

Yielded of Ash ·0112, which equal 49·5 per cent. of residue. This consisted chiefly of phosphate of lime, with a small quantity of the carbonate."

Is the presence of these concretions in the prostate to be regarded as a natural or as an abnormal circumstance? This question has been variously answered. I have examined not less than seventy prostates, at all ages over 20 years, and have detected them in every one. I have found them, also, in one specimen at 14 years of age; and have failed to find them in childhood. There is much difference, however, as to their number in different cases. In some—in most after 50 years of age—they are obvious enough to the naked eye in the urethra around the veru-montanum as soon as the canal is laid open; in others, it is necessary to make section of a lateral lobe, to scrape the surface, and place the milky, semi-transparent fluid under the microscope, when they may be seen, sometimes in small, sometimes in large, numbers. At other times it may be necessary to make several such sections before finding any. They are smaller, paler in colour, or even almost destitute of it, in young subjects; and *vice versâ* in aged: but there is not an unvarying relation in regard of number, size, &c., between their development and the age of the subject. In No. 40 of the series, from a man aged 66 years, I found more than in any I have ever examined, including subjects at 90. I estimated the number of dark-coloured concretions visible to the naked eye, in this case, as amounting to several thousands.

Generally speaking, they have been considered abnormal. One of the most recent writers on the subject, Wedl, regards them as the product of *enlarged* prostate.* From the facts just brought forward, I cannot, however, but conclude, that their existence is a necessary result of the performance of natural functions on the part of the prostate, although there does not appear to be any evidence to show that they ultimately disintegrate and yield up "some elements to the natural secretion of the gland," as has been suggested by an observer who has studied them closely.

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* Rudiments of Pathological Histology. By Carl Wedl. Translated by G. Busk, F.R.S. London, 1855. p. 269.

My examination of the preparations referred to has led me to the following conclusions respecting these bodies. It may, however, first be stated, in what manner the inquiry has been prosecuted. The urethral surface of each prostate has been exposed, and some concretions, if present, removed for examination. These have been submitted to the chemical tests enumerated, of which the results have been already given. Next, several sections have been made with Valentin's knife, and examined *in situ*. The best of these I have mounted in preservative fluid, of which I possess not less than a hundred examples, and from some of these the drawings (Plates IV. and V.), most admirably and truthfully executed by Mr. Tuffen West, illustrating this part of the work, have been taken. The fluid, also, which exudes from the prostatic ducts on pressure has been separately examined.

By such means, I have observed that in addition to the corpuscles, obviously epithelial or glandular, which are found abundantly in the prostatic fluid, however obtained, there are always present also, and in considerable numbers, some small yellowish bodies, in appearance sometimes granular, sometimes homogeneous, about the size of red blood corpuscles, but not so uniform, being from about $\frac{1}{5000}$ to $\frac{1}{2500}$ of an inch in diameter (Plate V. fig. 5); they possess considerable refractive power, nearly so much as to give them a resemblance to oil globules. They are not acted upon by ether, however, nor by the other reagents mentioned. They are not only found in the prostatic fluid, but may be washed from sections of the organ, and may be found lying in clusters, aggregated and adhering in various parts of it. Further, it is common to see small ducts and cœcal pouches stuffed with these bodies, as well as with yellow granules of smaller size, several marked examples of which are represented (Plate IV. *i i*, & Plate V. figs. 1, 2). In the larger masses, obviously occupying crypts, or follicles, of the glandular structure, these may be seen, not only cohering, but fused together; and then an appearance is presented identical with that which may be seen occupying the centre of the larger concretions. Judging from these appearances and the frequency of their occurrence, I cannot but conclude that the coalescence of these yellow bodies, or granules, their partial fusion into a mass, more or less homogeneous, the stratification, perhaps, in part, of this mass itself, or more probably the deposit upon its surface of fresh layers of fluid matter, similar to that which originally constituted the yellow bodies, and, finally, some additions of earthy matter to it, either by infiltration or accretion, are the steps by which the formation of a prostatic concretion is very frequently accomplished. Most, if not all, of the appearances thus described are very accurately shown in the drawings referred to. Those concretions which are not found lying at the orifices of the ducts, as at first described, occupy, generally, the larger ducts and follicles of the secreting portion of the organ. In examining sections under a power of 200 or 250 diameters, it is easy to see the circular arrangement of fibres around the concretion, when it has been preserved *in situ*, and in other places around the openings from which others have escaped (Plate V. fig. 4).

Perhaps all these yellow bodies are originally composed, that is in their earliest stages of formation, of purely organic matter, and that matter a product of the secreting structures of the prostate. At a very early period, however, they seem to be impregnated with the earthy constituent, in some form or proportion, which does not much impair the translucency of the object. Most appear to remain in this condition although liable to considerable increase in size after their formation, which, probably, at first, depends on that of the cavity in which the aggregation occurs.

When circumstances give rise to an addition of *opaque* earthy matters to the concretion, their size increases not only by such addition, but by that also of the organic matters with which such deposits are associated. It is then that they acquire density, more or less opacity, and give proof of the presence in large, that is, predominating quantity, of mineral constituents to chemical reagents.

The acquisition of this opaque earthy matter by a concretion may be thus explained. One of these bodies having formed within a follicle, and the size having greatly increased by fresh layers of secretion, it becomes, sooner or later, a kind of foreign body, and as such creates a certain degree of irritation. Now from mucous membranes throughout every part of the body, illustration may be derived of a mode of action, by which they deposit opaque earthy matter under certain forms or degrees of irritation; the product in all cases consisting chiefly of the phosphate, with a little of the carbonate of lime: the secreting membrane of the follicle appears to produce a fluid from which earthy salts are precipitated upon the nucleus, until its size has increased from that of a microscopic object, under favourable circumstances, it may be, even to that of a grain of pearl barley, or of a pea, or even larger. Together with this earthy matter, mucus, gland cells, &c., in varying proportions, will be also intermixed. Thus at various stages of their formation the chemical analysis of a prostatic concretion will exhibit a different result, being found to contain a larger proportion of organic matter in the early period, when only visible to the eye as dark points, and more of inorganic, when as large as those of the extreme sizes just described. Analyses of the latter have frequently been made, and the inorganic matters have amounted to 85 per cent., instead of 49½, as found in the smaller kinds examined here. Arrived at this stage, the walls of the follicle originally containing it, have become absorbed and have disappeared; other calculi from neighbouring crypts have come into contact with it by a similar process, and now, perchance, a number of these bodies will be found occupying together a single sac, in which the work of deposition ceases, and then they may lose their spheroidal form, and acquire facets by attrition or juxtaposition. There is, therefore, nothing more of a urinary character about these concretions than belongs to salivary, biliary, or other glandular concretions. But the case is somewhat different with some of the calculi which are found in diseased prostates, and which appear to be the products of bladder derangement as well as of prostatic secretion; these will be considered separately hereafter. Meantime it will be desirable very briefly to illustrate the history here given of the structure of the prostatic concretion, and of the steps by which it becomes approximated in constitution to a true calculous body, by an allusion to analogous processes which occur in mucous membranes of other parts of the system. As stated above, wherever there is a mucous membrane, or a simple follicular membrane exercising a secreting function, there exists the requisite agency for the production of earthy matter when certain kinds of irritation are applied to it. Thus is formed the phosphatic calculus of the urinary bladder, resulting from the irritation of chronic cystitis; so different in origin from the uric acid stone which descends from the kidney; and thus also the coating of phosphates, which the latter so frequently acquires after its arrival. So we find the salivary glands containing phosphatic calculus, a little spicula, as from the husk of some grain taken as food, having originally supplied both the irritation and the nucleus. The tonsil is the seat, although rarely of a similar occurrence. Still more rarely do the nasal passages, the pharynx and œsophagus furnish like forms; and doubtless through the agency of similar exciting causes. Throughout the intestinal canal, phosphatic formations have frequently been observed; in the north especially, the hard husk of the oat, which forms a staple article of diet, having there usually furnished the nucleus. With biliary calculi all are familiar. The histological elements of the liver secretion, inspissated by removal of water, enter largely into their composition, at first. Ultimately phosphatic salts, generally as in other concretions, the phosphate of lime, are added, and form a constituent part of the biliary calculus. In many respects there appears to be a considerable analogy between this product and the prostatic concretion, not only in manner of formation, as originating from an organic basis, and in the ultimate relative proportion of the mineral constituent, but in their frequency of occurrence. Besides these, I shall but allude to the similarity which obtains in the character and mode of formation of calculi in the lacrymal gland, in the frontal sinuses, in the mouth, in the pancreas, in the vesiculæ seminales, in the mammary ducts, and elsewhere.*

The views entertained here differ, it should be said, in some respects from those which have been held by some who have at a former period paid much attention to the subject. Dr. Handfield Jones published, in 1847, a very interesting paper describing the results of his researches,† which many of the observations here recorded have but fully confirmed. He, however, then believed the concretions to originate in a simple vesicle, containing granular matter, and generally a nucleus; and that they increase mainly by endogenous growth; regarding their origin and constitution to be entirely organic in the earlier stages of existence. Mr.

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* For an interesting and very complete account of these formations, see an article in the Cyclopædia of Anatomy and Physiology, under the title of "Adventitious Products," by Dr. W. H. Walshe, Professor of Medicine in University College.

† The Medical Gazette, Aug. 20, 1847, and Report of Pathological Society, 1846 7, p. 129.

Quekett, on the other hand, describes them as "commencing by a deposit of earthy matter in the secreting cells of the gland, increasing either by aggregation or by deposition in the form of concentric layers." *

With the first-named observer I am disposed to agree as to the organic composition of the concretions at first, a fact which must be regarded as proved by their behaviour with chemical reagents. As to the vesicular origin described, favoured as it seems to be by the appearance of some of the smaller formations, I feel, nevertheless, some difficulty in admitting the probability of such a mode of production, especially as we know of no process in regard of any other cell-formation, normal or abnormal, seen in the human body, which can be said to be at all analogous with it. As to the larger formations, I have little doubt, judging from the appearances already described, that they are often, if not always, produced by the aggregation in follicles, ducts, and in interstices of adjacent tissue, of the small yellow bodies which have been referred to.

What the "yellow bodies" are, I am not able satisfactorily to explain. Whether they are themselves altered secreting cells, from the gland follicles, or whether only the product of secretion by these structures, does not at present clearly appear. Thus much I have observed, that the small fusiform and spheroidal epithelium lining the prostatic ducts is often loaded with yellowish granular matter, appearing in all respects to be identical with that seen in a free state elsewhere, which seems to favour the view that it is a natural product of gland secretion (Plate V. figs. 3, 4). It may be added that I have constantly found similar yellow granules in the fluid of the vesiculæ seminales also, in which, at all events

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* The Anatomy and Diseases of the Prostate Gland. By John Adams. 2nd ed. 1853. p. 158.

in some elderly persons, they appear to be more constant than are spermatozoa (Plate V. fig. 6). In this situation, bodies which are evidently the same, have been described in a recent article on the vesiculæ seminales, by Mr. Pittard, appearing in the "Cyclopædia of Anatomy and Physiology," as "very numerous insoluble globules, which have a great tendency to coalesce, and appear very much like oil ;, their refractive power is, however, less, and there are reasons for doubting that they are really globules of oil." Besides these, the same observer finds "suspended little conglomerated masses of transparent solid, just visible to the naked eye," which have, under the microscope, the appearance of "a nodulated mulberry-like surface, as if composed of smaller balls ;" these, he thinks, are made up by a coalescing of the minute globules before mentioned.*

Virchow believes the concretions to be derived from a peculiar insoluble protein-substance mixed with the semen. Wedl, before referred to, regards them as identical with certain bodies found abundantly in the enlarged thyroid gland, and with those met with in the brain and spinal cord, especially in elderly subjects, and named "amyloid bodies" by Kölliker and Virchow. He believes all these to be the result of a pathological exudation frequently occurring in various organs in advanced age, and which he terms "colloid matter," on account of its resemblance in physical characters to liquid glue, and he proposes to call the concretions in question "concentric colloid corpuscles." He regards them as "principally composed of an organic substance, and consequently the names of 'stones' and 'concretions' to be inappropriate;" although he has occasionally observed that the colloid matter is deposited upon some of the rounded or nodular forms of calcareous salts, which are found scattered in the parenchyma of the prostate, and which thus form the nuclei of some few of the concretions.*

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* Cyclopædia of Anatomy and Physiology, p. 1433.

Reviewing, however, all that has been ascertained of the mode of formation and constitution of these bodies, I see no valid objection to the use of the term concretions, at all events for the small formations which have hitherto been described. Nor, perhaps, at present, is it easy to find a better, since it is one which involves no theory, except the simple one that the mode of aggregation of their component elements is mechanical, rather than organic in its essential character. When they have arrived at a size sufficient to occasion, as sources of irritation, the deposit of dense, opaque, earthy matter in the manner above referred to, they may be regarded as belonging to the category of calculus, rather than of concretion. The inorganic component now becomes predominant, the body increases in size; and although there is no exact period at which it can be said to cease to be a concretion and to become a calculus, yet there can be no hesitation as to which of the two terms should be applied to most examples met with of either kind.

Prostatic Calculi.—Prostatic calculi exist in very various sizes and forms. The smaller examples, which are most frequently met with, are rounded or ovoid; the larger are irregular, often elongated, sometimes branched, and commonly consist of several fragments uniting to form a mass. These fragments fit almost accurately, one to the other at their adjacent surfaces, but, nevertheless, appear to be separate and distinct calculi which have become adapted in form one to another, by close proximity. The small isolated formations are about the size of grains of pearl barley, rarely as large as peas; and these form the purest specimens of prostatic calculus. The masses formed by coalescence are of all sizes, but have been seen reaching the length of four or five inches in very rare instances. In the latter case they extend into and along the urethra, and even into the bladder. Still in these circumstances chemical analysis shows them to be mainly composed of phosphate of lime, and to have but a small admixture of the ordinary vesical or urinary product, the triple phosphate of ammonia and magnesia. They are in consistence hard, and so close in texture as to bear some resemblance to porcelain. They are white, fawn, or pale brown in colour, the surface being usually of a darker tint than the interior.

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* Rudiments of Pathological Histology. By C. Wedl. Translated for the Sydenham Society by G. Busk, F.R.S. 1855. pp. 38 and 271.

Analyses of several of the small round variety have been made, and the composition has pretty generally corresponded with the result of Dr. Wollaston's examination, who first pointed out their chemical character, and showed that they were not urinary products. Dr. Wollaston described them as composed of the neutral phosphate of lime, tinged with the secretion of the prostate.* Among modern observations, that of Lassaigne, which is generally quoted, may be adduced as follows:—

Phosphate of Lime . .	84·5
Carbonate of Lime . .	0·5
Animal matters, &c. . .	15·0
	100·0

We have already seen, however, that the proportions of these constituents may vary considerably. It appears that as we approach the earliest stages of their formation, the mineral constituent is found in diminished relative proportion to the animal. Thus the small concretions described at page 261, were composed of about equal parts of organic and inorganic matters.

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* Phil. Trans., 1797, p. 397.

These small prostatic calculi are often found lying, each in a separate space for itself, or hollow in the substance of the organ, corresponding with the size of the calculus itself.* At other times several occupy a larger space or cavity, in which they are movable; and thus their spheroidal form gives place to a more or less angular one, from their mutual pressure or attrition. In this state they may sometimes be felt by the finger introduced into the rectum, and the grating, from their movements one upon another when pressure is made, plainly perceived. At the same time a similar sensation is communicated to the hand by the catheter passed along the urethra, when the instrument traverses the prostatic part.

The larger masses formed by coalescence, while generally consisting mainly of the phosphate of lime, have usually enough of the triple phosphate in their composition to relate them more or less closely to the class called fusible calculus; this term being understood to embrace many varieties in regard of the relative proportions of the two phosphatic salts. These formations often occupy large spaces in the prostatic substance and among the adjacent tissues; irregular cavities which enlarge with the increasing bulk of the calculous formation. It is worthy of observation that they are most frequently met with in young men.

One of the most complete descriptions on record of a case in which an extremely large calculus of this kind existed, is that by Mr. T. Herbert Barker of Bedford. This gentleman successfully removed a mass formed by twenty-nine portions, weighing 3 ounces 4 drachms and a grain, from a patient 26 years of age. He describes them as of "a whitish colour, and porcelainous lustre and hardness, indeed the latter character is so well marked, that it is with some difficulty that any impression can be made upon them with a knife."* Dr. Golding Bird found it to "consist of phosphate of lime (like salivary and bronchial calculi), with a rather larger proportion than usual of the ammoniaco-magnesian phosphates." When the stone was restored by the adjustment of the fragments it measured 4$\frac{7}{8}$ inches in length.

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* Good examples of these small calculi, embedded in the substance of the prostate, may be seen as under:—

Royal College of Surgeons, Nos. 2519 and 2520.
University College Museum, Nos. 1640 and 3844.

Some examples of encysted calculi of the prostate are well represented in Mr. Crosse's Treatise on Calculus. London, 1835. Pl. xi.

A case very closely resembling this is recorded by the late Mr. Benj. Gooch of Norwich. The calculus consisted of sixteen fragments, which when applied to each other formed a mass nearly six inches in length. They are described as being "like alabaster in colour, and of as fine or rather a finer polish." A drawing is appended representing the natural size.†

Numerous cases have been detailed varying but little from the foregoing; ‡ except in the much smaller size of the calculus met with. Many surgeons of the last century refer to them, and to operative measures for their removal.[*]

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* Trans. Prov. Med. and Surg. Ass., 1847. Illustrated by an excellent drawing of the stone.

† Cases and Practical Remarks on Surgery. Norwich, 1777. Vol. ii. p. 174.

‡ Cases of calculi formed in the posterior part of the urethra (not merely lodged there, all being probably of prostatic origin :—

Mr. Jos. Warner, of Guy's Hospital, removed, from a man aged 20, two hard and polished calculi, weighing 350 grains, from the perineum, where they could be felt by the finger before the operation.—*Phil. Trans.*, vol. li. p. 304, with plate.

A second case, in which the calculi were very much larger, is reported by the same surgeon: patient aged 22.—*Phil. Trans.*, vol. lii. p. 258, with plate.

Dr. Livingston, of Aberdeen, two cases. *Edinburgh Essays and Observations*, vol. iii. p. 546. 1771.

Dr. Cheston, of Gloucester, one case.—*Medical Records and Researches*, vol. i. p. 163. 1798.

Mr. Wickham, of Winchester, a post-mortem case.—*Medical Facts*, vol. viii. p. 126. 1800.

The operative proceeding by which large prostatic calculi have been removed is usually an incision into the perineum carried into the urethra upon a grooved staff, in the manner and situation of lateral lithotomy. Occasionally, the opening has been made in the median line, *i. e.* in the raphe of the perineum. Undoubtedly this situation is the best and safest for the incision, inasmuch as the median

Dr. Marcet relates a case in which 100 calculi were found.—Drawn, Pl. ix. *Essay on Calculous Disorders.* 2nd ed. London, 1819.

Sir Astley Cooper relates three cases.—*Surgical Lectures*, 1825. Vol. ii. pp. 295, 296.

Sir B. Brodie, a case in which the calculi were lodged in a sac, from which he removed some by urethral forceps.—*Urinary Organs*, 4th ed. p. 362.

Mr. Crosse, of Norwich, several cases.—*Treatise on Calculus.* London, 1835. p. 26, *et seq.*

Mr. Liston removed one, of characteristic appearance, in several fragments, by a scoop, through the urethra.—Drawn, *Lancet, Oct.* 28, 1843.

Mr. Fergusson, of London, a case of thirty fragments, forming a mass as large as a walnut.—*Lancet*, 1848, vol. i. p. 91. Another large specimen.—*Lancet*, 1849, vol. ii. p. 552.

Mr. Erichsen, of London, a case of prostatic associated with vesical calculus in a youth.—*Lancet*, 1850, vol. ii. p. 575.

Dr. B. Jones, a post-mortem case, 10 fragments.—*Described and engraved in Path. Trans.*, vol. vi. p. 254.

Cases are on record in which calculi of this kind have escaped externally through abscess in the perineum.

Dupuytren, after dilating with the knife some perineal fistulæ, removed twelve calculi with articulating surfaces, from, as he believed, the prostate. Thénard analyzed them, and found 86 per cent. of phosphate of lime, 13 of animal matter, and traces of carbonate of lime.—*Journ. Univ. des Sciences Méd.*, Aug. 1820.

Lenoir and Nelaton, a case each; made up of several fragments; removed by simple pressure, by lithotrity, and by cutting.—*Gaz. des Hopitaux*, 1846.

Good examples are preserved in the Museum of the College of Surgeons: the best are those numbered H. 13, 15, and 23. The first, which is the largest, weighs one ounce and ninety-five grains.

[*] Dionis. Oper. de Chir., par La Faye, p. 221. Deschamps, sur la Taille, tom. iv. p. 161, *et seq.*, 1796. Sabatier, Méd. Opératoire, tom. iii. p. 136. 1810.

opening gives a more complete command of the position occupied by the stone; and is also a nearer and less hazardous route to the neck of the bladder under any circumstances. The operation is far less dangerous than that of ordinary lithotomy, as the bladder remains untouched, supposing there is no vesical calculus also, a point which must be carefully investigated beforehand. Especial care must be taken at the time of operation to remove all the fragments which are lodged in the prostate so as not to leave nuclei for fresh deposit.

Sir B. Brodie relates a case in which he removed small prostatic calculi with the long urethral forceps; but some of these escaped also into the bladder, and had subsequently to be removed from that situation.

The existence of these bodies when small, and embedded in the prostate, is not revealed by symptoms during life. When by their increased size irritation is set up, abscess may be formed, or obstruction to the flow of urine be occasioned; the latter may take place also from the escape of small calculi into the urethra. The treatment of these consists in their removal if possible by means of the forceps, or long curette, in the same manner as advised for the removal of fragments after the operation of lithotrity, in the succeeding chapter. But when marked symptoms are present, and a foreign body can be ascertained by the sound, or catheter, to be embedded anterior to the neck of the bladder, or when it can be recognized from the rectum or perineum, an incision from the latter spot will offer a simple and efficient means of removing it.

CHAPTER XIV.

ON THE RELATION BETWEEN ENLARGED PROSTATE AND STONE IN THE BLADDER.

Vesical Calculus a frequent result of Enlarged Prostate.—How this may be accounted for.—Calculus often overlooked.—Best means of discovering it, by Sounding, &c.—Difficulties in removing it.—Lithotomy and Lithotrity. —Objections to each considered.—General applicability of Lithotrity.—Experience of various Surgeons.—Removal of Fragments by Scoop-lithotrite; by evacuating Catheter; Sir P. Crampton's Apparatus.—Position of the Patient.—Injection of Solvents.—Dr. Hoskin's proposal.—Decomponents.—Impaction of Fragments.—Treatment.—Course to be pursued when Bladder is extremely irritable.—Value of Treatment.—Preparatory Measures.—Palliatives.

So closely connected is enlargement of the prostate with the formation of earthy deposits in the bladder, that it is almost impossible to avoid a consideration in these pages of that great subject, at all events under one of its several aspects, and that certainly neither the least difficult, nor the least important one. It would be almost as easy or as consistent to decline treating of the best methods of affording relief to complete urinary retention arising from the same enlargement, as to overlook a result, no less important and no less frequent; although not so urgent in the course and nature of its symptoms. For it is impossible that any man can have the care of many cases of enlarged prostate, without meeting also several of calculous formation in the bladder, although, it is not less true that he may occasionally, perhaps more frequently than has been supposed, overlook its existence, so much are the symptoms of the one malady masked by those of the other. Of this

I have witnessed not a few instances. And it is not a matter to which the surgeon may be indifferent, although the distress which the calculus appears to produce in any given case of the prostatic affection may be comparatively slight in degree. Because, as we have seen in a previous chapter, any source of vesical irritation—and there are few more potent than the presence of such a foreign body—tends to augment the difficulties attendant upon the already-enlarged organ, it may be to increase its rate of development, and to hasten the catastrophe which all our treatment is, or should be, directed to avert. The importance of the calculous complication is therefore to be estimated, not altogether according to the marked character of the symptoms by which its presence is rendered obvious, nor by the actual degree of suffering which it causes to the patient himself.

That calculous disease and prostatic enlargement frequently coexist is a fact which our museums testify in unmistakable language, and which daily experience corroborates.

Not only does our experience of the living also point to the same fact, but the grounds of the relation are so obvious as to render it almost impossible that the result should be otherwise than it is. The calculus which is produced under these circumstances is generally, although not invariably, one of vesical origin, that is, one originating entirely in the bladder itself. From the altered condition of urine depending upon constant or long-continued retention within the viscus, of a certain quantity which cannot be expelled by the efforts of the patient, owing to the existence of obstruction at its neck, irritation of the mucous lining is set up, and much viscid secretion is often poured out. This action having long-continued, it will frequently be observed that some whitish soft or gritty matter, a phosphatic deposit, is evolved from the same source; at first, perhaps, only in inconsiderable quantity. This may pass off entirely with the mucus, in which streaky portions are seen to be entangled. And no more than this may occur. The formation may take place in small quantities, and may possess no very great cohesive power, in which case the bladder may be maintained tolerably clear by occasionally injecting it with warm water, either unmixed, or to which a minute quantity of mineral acid has been added. On the other hand, the calculous deposit may assume a more solid consistence, a nucleus may be formed, and aggregation taking place, a phosphatic stone may not slowly result. This condition is very much favoured by the state of the urine itself under circumstances of retention, as instead of being acid, and so affording a menstruum favourable to the solution of a phosphatic formation, it becomes alkaline; and not only aids in giving rise to irritation of the mucous membrane, but also in maintaining the existence of the earthy formation when produced. In the same manner, also, if a solid body be introduced into the bladder while the urine remains in this unhealthy condition, it is almost certain rapidly to acquire a coating of this same deposit. And so it happens that if a small renal calculus which consists of uric acid or urates, or of oxalic acid, descend at this time through the ureter, a large phosphatic stone will probably at no very long time be formed upon it as a nucleus. But this descent of the renal product is no mere contingency under the circumstances, no mere unlikely coincidence with the vesical state; there is very little reason to doubt that, in some cases, a formation results from abnormal action of the kidney set up by irritation propagated upwards from the bladder. Perhaps the vesical origin of renal calculus is not always sufficiently recognized; and it may be a question whether we are not rather too prone to attribute its existence to a calculous tendency in the system,—to a uric acid, an oxalic, or a phosphatic diathesis. Far be it from me to ignore the constitutional tendencies which undoubtedly give rise to calculous formation in the human constitution; I only believe that the phenomena presented by calculous patients must lead us in numerous cases, but especially among those who are the subjects of enlarged prostate to regard their complaints as of local rather than of constitutional origin.

The relation which prostatic enlargement bears to these formations may be explained more fully. Two circumstances commonly concur to play a chief part in the production of calculous matter. These act and react on each other, and intensify the state which favours such production.

First,—There is the altered condition of the urine itself, resulting from its retention within the bladder by obstruction at the neck. This change consists in its alkalinity, and in its consequent tendency to deposit the earthy phosphates in the form of an insoluble precipitate. The alkalinity may be attributed primarily to the following source; viz. to the production of carbonate of ammonia from the decomposition of urea, favoured by the presence of some organic matter (probably mucus); a process which takes place in the urine of a healthy person, if permitted to stand in the air for a day or two after its removal from the body. It now deposits the phosphate of lime and magnesia, which in small proportion are normal constituents of healthy urine, but which require its normally-acid condition in order to remain in their natural state of solution. As soon as it becomes alkaline then, these tend to precipitate, and doing so in presence of the carbonate of ammonia just referred to, there results the formation of a triple phosphate of ammonia and magnesia, with some phosphate of lime, and a very small quantity of carbonate of lime. Such are the constituents of the deposits so frequently met with in these circumstances, and the same are found entering largely into the composition of a very considerable proportion of the calculi formed at all ages, but particularly of those which occur at advanced periods of life.

Secondly,—There is the unhealthy state of the mucous membrane lining the bladder, which results from the altered condition of the urine, and augments the tendency both to alkalinity and to deposit.

The highly-irritating salt carbonate of ammonia, being habitually produced in the manner described, unnatural vascular excitement in the mucous membrane is set up, and an unusual quantity of its secretion is poured out which is naturally alkaline; this added to the urine, even when the latter is in its normally-acid condition, is sufficient to render it alkaline. But when the urine is already decomposed from retention, the action of the irritated mucous membrane considerably intensifies the morbid quality. But again, this mucus, or muco-pus, which is so familiarly known by the tenacious and adhesive character which it presents when removed from the body and cooled, contains itself also earthy phosphates, chiefly the phosphate of lime, with a trace of the carbonate, and often to a large amount; these, being, of course, insoluble in the alkaline secretion, are also precipitated in addition to those derived from the urinary secretion proper. Thus the inorganic constituents of a phosphatic calculus are abundantly supplied, and in circumstances particularly favourable to its formation, viz. in a surrounding menstruum in which solution of the earthy precipitate cannot be effected; contained in a cavity from which, both on account of its form and impaired vital powers, the contents are with difficulty expelled, and in which, consequently, aggregation and concretion are promoted; while, lastly, all this takes place in presence of an adhesive organic material, well adapted to form a binding cement for the saline particles of calculous matter. As might be expected under such circumstances, the resulting formation most commonly met with is the fusible calculus, composed of the phosphate of ammonia and magnesia, intermixed with the phosphate of lime in greater or less abundance; the proportions doubtless depending on the relative preponderating influence of either of the two sources of the deposit pointed out.

The calculous contents of the bladder resulting from, and so frequently associated with, enlarged prostate, assume two forms as regards their physical condition, viz. spheroidal or ovoid masses of moderately-firm consistence, and semi-solid matter, well compared to mortar, to which it bears a great resemblance both in appearance and texture. Of these, the former are more commonly met with than the latter.

Whenever the symptoms accompanying enlarged prostate in any case are more severe than those which are ordinarily encountered, whenever the occasional appearance of blood in the urine has been noted, unassociated with the use of the catheter, and occurring especially after moderate exercise, inquiry should be made for calculus. We have already seen how much the ordinary signs of its presence are frequently masked by the enlargement, partly from the fact that the foreign body is less liable to come in contact with the neck of the bladder, and partly because the viscus itself is often unable to contract altogether upon its contents, and so the pain at the end of the act of micturition is but slight, or may be absent altogether. Nevertheless, it is not the less important to verify the fact of its existence or the contrary, and this occasionally requires a mode of search more rigorous in some respects than that adopted in ordinary cases, and one which is specially adapted to the circumstances resulting from this form of complaint. The ordinary catheter will probably fail to encounter the stone, and thus it is that its presence is often never suspected, although it may have existed for years; the daily use of such an instrument having been deemed incompatible with its non-discovery. Generally, the foreign body lies in a depression behind the enlarged prostate, below the level of the urethro-vesical orifice, and hence will rarely be detected except by the use of the short-curved or angular sound or catheter (figs. 12 and 13, page 99), the beak of which, if sufficiently short, that is, less than one inch in length, can, after introduction into the bladder, be turned downwards with perfect ease behind the base of the prostate into this depression. In some cases even this movement fails to reach the stone, and other means must be adopted. Thus the finger of the left hand being introduced into the rectum, sometimes suffices to elevate the base of the bladder or to displace the stone, and permit contact between it and the sound to be made. A more certain mode perhaps than any other is a change in the position of the body of the patient. The pelvis alone may be elevated on a large, hard, and well-stuffed cushion, so that the upper part of the bladder becomes the depending part, into which the stone may, especially by a sudden slight movement, be made to roll. Sometimes this has been achieved by suddenly lowering the head and shoulders of the patient, a position provided for by Baron Heurteloup in his rectangular bed; and much adopted by the late Mr. Aston Key, who simplified that apparatus for his own use, and with a special view to the discovery of a stone which might be concealed by enlarged prostate.*

Or, as Sir B. Brodie remarks, "the same purpose will be answered sufficiently well, if the patient be placed on a light sofa, the end of which may be raised by an assistant."† The sound to be employed should not only possess the form just indicated, but should be hollow, so as to admit of the passage of a stream of water through it either inwards or outwards as may be required. Such an instrument saves the preliminary passing of a catheter to determine the quantity of urine, or the capacity of the bladder, and serves for the purpose of injecting fresh fluid; and the urethra is thus traversed once only, instead of two or three times, while all these objects are accomplished. The sound should be made of steel, that it may possess weight and solidity; characters in which Heurteloup's catheter made of silver in the same form, and employed for the same purposes, was deficient. It should also be plated, that the channel, which is necessarily smaller than that of a middle-sized catheter, may not be blocked up by rust, an accident which is otherwise very apt to happen. There should be also a plug or stopcock, at the handle, the opening in the latter being adapted to fit the nozzle of the injecting instrument.

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* Mr. Key's Chair is engraved and described in the Guy's Hospital Reports, vol. iv. pp. 45-56.

† Med. Chir. Trans., vol. xxxviii. p. 174.

The sound having been introduced into the bladder the urine may be permitted to flow through it, when the expelling power of the organ may be estimated by the force of the stream, as well as the influence which can be exerted upon it by the voluntary efforts of the patient; the capacity of the bladder, and its degree of irritability can also be determined. Three or four ounces of warm water are then to be slowly injected, and the search conducted by passing the beak laterally from the prostate to the upper part of the bladder, first on one side, then on the other. The instrument having been directed through the upper fundus and back part is now conducted to the depression behind the prostate. Withdrawing it until the beak arrives as near to the neck of the bladder as the tumor permits, the handle is slowly depressed between the patient's thighs, so that it can be fairly rotated, and its beak turned downwards towards the rectum. It is then moved gently to the right and left, backwards and forwards, during which it will probably be felt to glide lightly over some projecting muscular columns, if the bladder be fasciculated. But before this last-named movement is executed, it is sometimes necessary to inject two or three additional ounces of water, or even more, provided it is easily retained, in order to distend the bladder a little more, and so permit perfect freedom of motion to the beak of the sound. At this point, if nothing is found, the patient's pelvis may be elevated in order to dislodge the suspected calculus from behind the prostate, and throw it into the body, or towards the upper part of the bladder. Nothing being still discovered, the patient may be placed in the upright posture, or he may be partially seated, while the water is permitted to flow through the sound; during which it sometimes happens that the stone is brought down against the sound, or that the relations of parts are in some way altered, so as to permit a stone to be felt which had hitherto escaped detection. As Civiale has long ago shown, there is, for most cases, no better sound than a lithotrite, and it is for these particularly advantageous. The ability to open the blades a little presents a fresh mode of searching, and enables the operator to sweep a larger field in the distended bladder, adding to our chances especially when seeking to detect small fragments. Accordingly, in order to avail himself of this instrument, and, at the same time, of the advantages possessed by the hollow sound, he has recently employed a lithotrite, of which the male blade contains a channel, so as to permit water either to be injected through it, or to escape, during its employment in the bladder, whether for sounding or for crushing the stone.

The presence of calculus having been verified, the mode of removing it comes next under consideration.

Enlargement of the prostate is doubtless a source of difficulty in the performance both of lithotomy and lithotrity.

In lithotomy it prevents the finger from reaching the bladder, and determining the situation of the stone, renders the application of the forceps much more uncertain, and the seizing and extraction of the stone much more difficult. The distance from the surface of the perineum to the vesical cavity is increased in proportion to the degree of enlargement. The prostatic urethra, as we have seen, may be lengthened from one and a half inch to three inches, or even a little more, and beyond this there may be a tumor projecting, over which any instrument must be carried before the calculus, which lies deeply behind it, can be reached. In any case of notable enlargement, yet far short of an extreme size, the finger can barely reach the bladder, it certainly cannot touch the stone, much less verify or influence its position. Again, the depth of the wound limits the motions of the forceps considerably; it is not merely necessary to seize the object without the assistance of the finger, but the range of movements possible to the instrument is circumscribed—indeed, in some cases it would scarcely be possible to obtain contact with the calculus unless the blades were specially curved to enable the operator to search behind the prostate for it. On the same ground, the extraction is considerably more difficult; an increased length of passage requires a proportionate augmentation of diameter, in other words a more extended use of the knife, to permit a facility for extraction equal to that enjoyed in ordinary cases.

In lithotrity, the enlarged prostate affords an obstacle more or less considerable to the easy introduction of the instrument; causes a little more difficulty sometimes in seizing the stone; and opposes a bar to the free discharge of the fragments.

The first two sources of difficulty are, however, comparatively of small consequence; the last is by far the most serious.

A careful and judicious manipulation of the lithotrite will not fail in overcoming the difficulties met with in traversing the urethra, even when considerably deviating from the normal direction and length. Directions for its management in these cases have been given in chapter the eighth in connection with the subject of Catheterism in enlarged prostate; and the remarks just made in reference to the operation of sounding will still further aid in illustrating the method to be adopted. The lithotrite having been introduced and brought to bear in the process of search upon the rectal aspect of the bladder, the blades may in this position be opened, and the stone picked up, usually without much difficulty. The instrument may then be carefully turned round, so as to direct the beak upwards, before the screw is applied and the crushing effected; or, without making this movement, pressure may be made by the hand alone, or by the screw, in the reversed position. M. Civiale does not hesitate to crush in this manner, considering that the movement round from below upwards is often unnecessary, and as such to be avoided; and this manœuvre I have on more than one occasion seen him perform in the most successful manner. I believe it will usually be difficult, sometimes impossible, to seize a stone lodged in a deep or depressed basfond below the level of the vesico-urethral orifice, without searching for it by reversing the blades; carrying the instrument, in short, to the stone, not waiting for the latter to fall into the instrument. It is true that the stone may sometimes be dislodged and removed to another situation, as has been already stated, by elevating the pelvis of the patient very considerably, but in this case it becomes equally an object of search; whereas in the condition described it may almost certainly be found by proceeding in the manner specified. It is not sufficient simply to introduce the lithotrite and open the blades, for assuredly in these cases the stone will not fall between them, as often happens in the bladder which retains its normal form and capacity, or nearly so.

There can be no doubt that the main objections to lithotrity in cases of enlarged prostate, do not lie on the ground of any particular difficulty in performing the operation. A far more formidable obstacle is a contracted irritable bladder, which will not easily retain the requisite quantity of fluid; in which there is neither space enough to work, nor ability to bear the necessary manipulation. Neither of these conditions commonly exist in association with enlarged prostate, for, on the contrary, the bladder is generally dilated, and the urethra often well accustomed to instrumental contact. The objection on the ground of the difficulty of expelling the fragments is certainly more considerable. The power of the bladder being impaired, at all events an obstruction existing at the outlet, it does happen that the detritus is not always got rid of with facility. This, however, is by no means an insuperable difficulty, and will be specially considered hereafter.

In consequence of these circumstances, lithotrity has been held by some authorities to be contraindicated in presence of an enlarged prostate. Sir B. Brodie's experience leads him, however, to speak in favour of its adoption. Thus, he says, in relation to the introduction of the lithotrite, in "cases of considerable enlargement of the prostate gland, I have never met with an instance in which the difficulty was not overcome by a cautious and gentle manipulation, nor with any in which any injury was done to the neck of the bladder in this part of the operation."* The increased difficulty in seizing the stone, which he regards as "the most important part of the operation," he represents as readily overcome by ordinary management. And in relation to the removal of the fragments, he expresses himself as follows:—

"In an elderly person, in whom there is usually more or less enlargement of the prostate gland, the fragments do not come away so readily as in those who are younger. This especially happens where the patient has lost the power of emptying the bladder by his own efforts. It would be a mistake, however, to suppose that the incapability of expelling the whole of the urine prevents them from coming away altogether; still the process is more tedious, and requires some assistance beyond that which is required under ordinary circumstances. Firstly, the patient should be directed to void his urine stooping forward, or even in the recumbent posture, lying with his face downwards. Secondly, tepid water should be injected by means of a syringe, or elastic gum bottle, through a large silver catheter, having a wide aperture near its extremity on the concave side, by which means fragments below a certain size may be washed out of the bladder. This may be done daily, the injection being repeated on each occasion three or four times. In one instance, in which a complete retention of urine followed the crushing of a large calculus, in the course of two or three weeks the whole of the fragments were thus brought away, the patient regaining the power of emptying the bladder afterwards."[*]

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* Notes on Lithotrity. By Sir B. Brodie, Bart.—*Trans. Med. and Chir. Soc.*, 1855, p. 172.

On these points Mr. Coulson emits nearly similar opinions. He considers a paralyzed condition of the bladder by no means to contraindicate lithotrity.[†] Sir Philip Crampton also, whose experience is very considerable, states his belief that this "state furnishes no objection to the application of lithotrity, provided sufficient means be employed to rid the bladder of the fragments of the broken calculus," adducing the case of a gentleman, aged 71, from whom he removed, by six applications of the lithotrite, a stone two inches in diameter: in this case the "bladder was so completely paralyzed that, for several years, he had been obliged to draw off the urine by the catheter four or five times a day."*

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[*] Notes on Lithotrity. By Sir B. Brodie, Bart.—*Trans. Med. and Chir. Society*, 1855, pp. 178, 179. In this extremely valuable paper are presented the result of the author's practice in 115 operations of lithotrity, performed upon upwards of 100 adult patients. Of these 115 cases, the sequel was unfavourable in 9; but death could be only attributed directly to the operation in 5 instances. In 4 it resulted from old-standing disease brought into activity by the shock of the operation. The success of the operation was thus shown to have been as somewhat more than 12½ to 1. For further particulars, see also analysis of the paper, *Lancet*, 1855, vol. i. p. 316.

[†] Diseases of Bladder] and Prostate Gland. 5th ed. London, 1857. pp. 470 and 485, *inter alia*.

Civiale, the great master of the art, treats at length of this subject in his various writings, and adduces his experience respecting it. The sum of this forms the basis of an opinion in favour of applying lithotrity to ordinary, but not to extreme or extraordinary cases of enlarged prostate. For such, he would prefer, an operation being imperative, the operation of hypogastric lithotomy. With respect to the instrumental difficulties of the proceeding, he was accustomed to overcome them even with the straight lithotrites which he originally employed, and he regards the adoption of the curved instruments now in use, as removing the objections made on the score of difficulty of introduction in presence of a large prostatic tumor. He recommends the stone to be seized in the manner already described, a method of manipulation absolutely necessary, in his opinion, to detect the residual fragments which are certain to lodge behind the prostate. He recognizes the influence of obstruction at the vesical neck in occasioning retention of detritus, but believes it may be overcome in most cases by the use of full and repeated injections after each application of the lithotrite.

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* Lecture on Lithotrity.—*Dublin Quarterly Journal*, 1846, vol. i. p. 52. Sir P. Crampton relates the particulars of twenty operations by lithotrity on seventeen adults. There was no death. All were successful, with the exception of one who discontinued treatment from causes unconnected with the operation, and one who died of rupture of the stomach from excessive drinking during his treatment. Of the successful cases, one was a patient aged 65, who submitted to two operations, with an interval of some years, and lived in perfect freedom from the complaint four years after the last. Another, aged 71, submitted to two operations with six or seven months' interval, and lived ten years with no return of symptoms. Another, aged 71 (the case alluded to in the text), with "immense prostate," was completely freed from the stone and lived three years without return.

He appends, in his "Traité de la Lithotritie," p. 163, brief particulars of fifteen cases in which he successfully crushed calculi complicated with prostatic enlargement. The treatment was in some of these more difficult, painful, and prolonged than usual, but otherwise no particular deviation from the ordinary course of things is remarked. The ages of the patients varied from 60 to 81 years, the majority being about 70.

Of the objections which have been made to the employment of lithotrity in enlarged prostate, one of the principal is that the cavity of the bladder may be so diminished by the prostatic outgrowth, that sufficient room is not left for the proper manipulation of the lithotrite. In reply to this, without denying the existence of the state described, I am in a position to affirm that it is extremely rare. Dilatation of the bladder is almost invariably the sequence of prostatic enlargement, and that to an extent proportionate with the amount of the obstruction. This is undoubtedly a law almost universal in its application. Hence it follows, and a large field of observation proclaims the fact, that abundant compensation in the matter of space usually exists in dilatation of the viscus, for any encroachment on its cavity arising from the growth of a prostatic tumor into it.

Another source of evidence, and that of an extremely valuable kind, is afforded us in a report which has recently appeared in Germany, and which may be closely studied here with advantage. It does not consist of a mere general expression of experience, or of an opinion formuled from unafforded data, but of a simple narrative of the author's experience in the application of lithotrity to between eighty and ninety elderly persons. How valuable the sum total of a large personal experience may be made, by means of brief notes faithfully recorded at the time, is apparent from the reports by Sir B. Brodie, and Sir P. Crampton, already referred to; examples worthy of imitation to all succeeding students of scientific surgery. But from Continental experience alone could we derive so extended a record as the one in question, inasmuch as on the Continent only is the full application in practice of lithotrity made; and its source is one which possesses the highest order of reliability. At the thirty-second annual meeting of "the German Naturalists and Physicians" (the institution which suggested our own British Association), held at Vienna in September of last year, Dr. Ivanchich of Vienna read a paper in the Surgical section, embodying a statistical account of one hundred cases of lithotrity treated by himself; the great majority of patients being males of fifty years old and upwards.

With very few exceptions indeed, Dr. Ivanchich gives the name at length, the residence, and occupation of each patient; so that it is competent to any inquirer to investigate any one of his statements of detail. The age, the peculiar complication present, if any, the composition of the calculus, the weight of the detritus removed, the number of sitings required, the number of days occupied by the treatment, and the final results, are recorded.

From this document I have extracted all the male cases of fifty years and upwards, and have tabulated them in order to give a statistical result in a few lines here.

Eighty-one male patients were operated upon by lithotrity, of the following ages:—

31	were between	50 and 60 years,
34	,, ,,	60 and 70 ,,
16	,, ,,	70 and upwards.
81		

In fifty-three the calculus was uric acid; in twenty-four phosphatic; in two mixed; and in two the composition is not stated.

Of the eighty-one patients, eight died within a short period after the operation from fever, shock, &c.; but in one the disease was complicated with stricture of the urethra and renal calculi; in another with large renal calculus. Most were above 70 years of age. One, aged 75, exhibited "a remarkable example of valvular prostatic disease." It would not be fair to say that in every one of these eight instances the cause of death was altogether attributable to the operation.

Besides the eight, one died two months, and another six months after the operation of diseased kidneys; and a third died of cancer at the end of a month.

Of the seventy remaining cases, four or five are reported incomplete, and the remaining sixty-five as successful. In some instances the sittings were numerous, and the treatment protracted; but these cases were few and exceptional.

But of the eighty-one cases, eight had notable hypertrophy of the prostate: two of these had been operated on three years before. In one the results were "incomplete;" all the others were successfully treated; one only, alluded to above, dying with great enlargement at the age of 75. In five of these the stone was phosphatic; and in three, of uric acid. *

Taking the most unfavourable view of eighty-one cases of patients above 50 years of age here recorded, the deaths amount to not more than one in ten; a result which, it is needless to say, is vastly superior to our experience of lithotomy in patients of corresponding age. The experience of our metropolitan hospitals, at this period of life, records a fatal result in at least two out of every five cases subjected to the latter operation.

We now come to a consideration of the method to be adopted in the management of that which I have heretofore characterized as constituting, in some of these cases, the

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* Wien Wochenschrift, 1856. Beilage, No. 51.

most troublesome part of the process, viz. the withdrawal of the calculous fragments from the bladder.

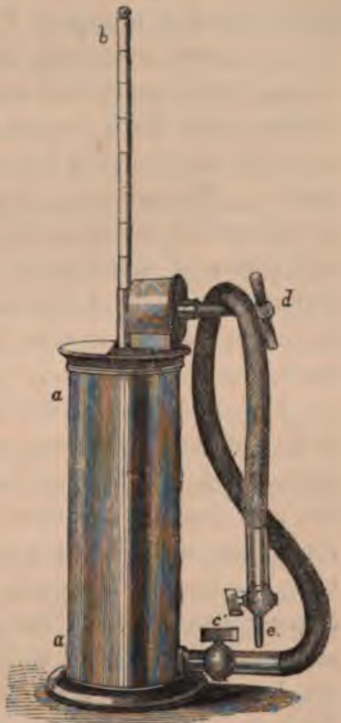
There are four methods of proceeding, each one of which may be brought to bear in cases where any difficulty is apprehended, or encountered. All may be employed under certain circumstances conjointly, and with advantage.

These are—the employment of the scoop lithotrite; repeated injections of water, returned through a full-sized catheter with a large opening near its extremity, with or without a special exhausting apparatus attached; the position of the patient during subsequent acts of micturition; and the injection of solvents into the bladder. Each of these we may now examine in detail.

1. The application of the scoop lithotrite.

The use of the scoop lithotrite is so obvious, and its characters so well known, that it is necessary to do little more than mention it here. By its aid we may in some cases remove a good deal of fragmentary or of semi-solid calculous matter, without injury to the narrow passage through which it is to be withdrawn. It is, however, a slow process: involves a great deal of passing and repassing along the urethra, and may do much mischief when rough spiculæ are caught between its jaws, and project a little beyond their borders; an occurrence which will sometimes happen, and is not always absolutely to be guarded against; although it may be in a great measure prevented by invariably screwing home the male blade completely, before attempting to withdraw the instrument. The mechanical action of hard bodies within the bladder, however, is always to be avoided when not strictly necessary. In the management of stone in the bladder, no axiom is better established, or more religiously to be followed, than this; viz. the smaller the mechanical power expended in the attainment of any given effect, the more successful will be the final result. The lithotrite is to be employed for no purpose which can be attained by milder and better agencies. We, may perhaps, find means of a mechanical nature which are superior even to the lithotrite under certain circumstances, in the attainment of the object desired; while in others we may have a safer and a better resource in the more subtle dynamics of chemical action.

FIG. 20.*



a a. A cylinder containing about 16 oz. of water.

b. The piston-rod, graduated. The descent of each mark, when the instrument is in action, indicates that two oz. have been injected.

c. The regulating stop-cock, and elastic tube for adaptation to the catheter at the stop-cock, *e*

d. Key for winding up the spring, which gives the motive-power.

2. Injections of water and the evacuating catheter.

The catheter usually employed immediately after a calculus has been crushed is one not smaller than No. 12, if it can be easily introduced; it may be even larger if the urethra will readily admit it, which is not unfrequently the case. An oval aperture, about three-quarters of an inch in length, is made in its concavity, through which fragments of moderate size may make their escape. This instrument being introduced when the lithotrite is withdrawn, the patient may stand upright or lean forwards a little, when a few ounces of tepid water are quickly injected, and permitted instantly to flow out, before the débris, stirred up by the act of injecting, can subside; when some of it usually escapes, although more commonly less passes than one might at first thought suppose. The process should, however, in order to prove successful, be rapidly repeated three or four times, if not productive of uneasiness to the patient. In this manner much débris may be removed, and many small fragments, if the stone has been well crushed, and not merely broken. The catheter is then withdrawn, care being taken, in commencing to remove it, to recognize the occurrence of any degree of obstruction, while its extremity is passing through the neck of the bladder, as a fragment may be lodged in the opening described, but with a rough or sharp angle protruding beyond it; and great pain, if not some mischief to the neck of the bladder, may result if the possibility of this contingency be not remembered and provided against. If, therefore, on beginning to withdraw the catheter, anything like obstruction is felt, or a sharp pain is complained of, it is better to inject again, which will, probably displace the fragment, and enable us to remove the catheter with ease. If this fails, however, a flexible but strong stilet, of a size sufficient to fill the catheter, with which it should always be provided, may be passed down to the end of the instrument; this will always succeed in getting rid of the obstacle, and the removal of the catheter follows without difficulty. The catheter of Heurteloup is, perhaps, preferable to that just described. This instrument, made of steel, possesses two long oval openings, situated near to the extremity. Each should be about three-quarters of an inch long; and, placed *laterally*, one rather nearer to the point than the other. It is represented in connection with other instruments by fig. 23, page 298.

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* This, which is by far the best apparatus for injecting the bladder with water or other fluids, not exerting a chemical action on metal, is an adaptation of a recently-invented enema-pump, by means of which the fluid is propelled by a powerful spring at the will of the operator, and independently of any effort or his part, except for the purpose of regulating the force of the current, which, by simply placing a finger on the stop-cock, is done in the most perfect manner.

Sir Philip Crampton has applied with success an exhausting apparatus to the extremity of the catheter, for the purpose of removing detritus from a distended and atonied bladder. One of the cases reported in his most valuable and interesting paper on lithotomy and lithotrity before referred to, was that of a Mr. Rodger, aged 71, who had "paralysis of the bladder, immense prostate, urine muco-purulent and bloody, and a stone two inches in diameter." This gentleman "had totally lost the expulsive power of the bladder" for several years before.* In this case the whole of the detritus was removed in this manner. Six sittings were sufficient to free the patient from every vestige of the stone, and he lived three years after with no return of the calculous affection. Sir P. Crampton informs me that Mr. Liston was present at the fourth sitting, and, having witnessed the employment of the exhausting apparatus, was so satisfied with the result that he obtained one for the purpose of using in practice. Whether the opportunity was afforded is doubtful, as his lamented death took place but a few months afterwards.

The apparatus is thus described in the paper referred to. It consists "of a strong glass vessel of an oval form, and six or eight inches in length, by three in diameter, capable of holding about a pint and a half of water; to this vessel is attached a tube of about half an inch bore, furnished with a stopcock. The air being exhausted by means of an exhausting syringe, and one of Heurteloup's wide-eyed steel evacuating catheters being introduced into the bladder, it is next attached to the exhausted vessel; the stopcock is then turned, and a communication being thus established between the bladder and the glass, the pressure of the atmosphere is by this means brought to bear on the bladder, and supplies an expulsive power, which may be increased to any required amount."*

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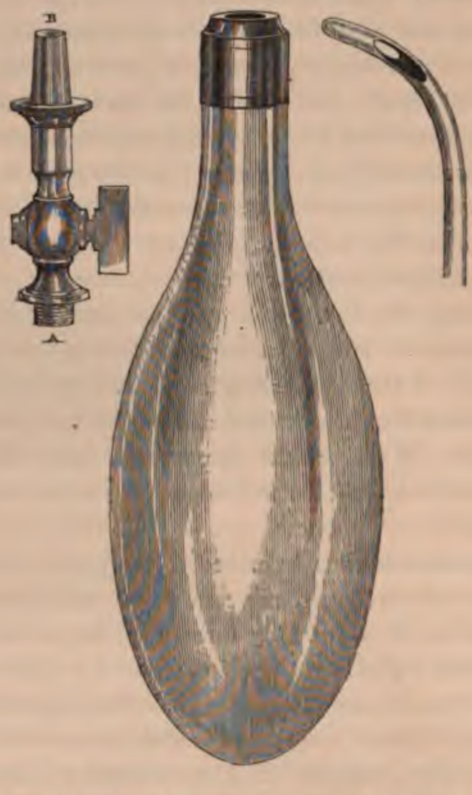
* Dublin Quarterly Journal, Feb. 1846, pp. 22 and 43.

Fig. 21. Fig. 22. Fig. 23.



Figs. 21 and 22 represent Sir P. Crampton's apparatus—Fig. 21 is the piece which unites the exhausted receiver and the catheter. A is the end which screws to the receiver; and B that which fits the catheter.

Fig. 23 represents the lower end of Heurteloup's steel catheter.

The only precaution necessary in its use that must be observed, is to proportion the degree of exhaustion in the glass receiver to the quantity of water previously injected into the bladder. By a few preliminary trials its power is ascertained, the operator learning in this manner that so many strokes of the exhausting syringe will produce a vacuum equal to so many ounces of water. For example, ten strokes of the syringe in my instrument produce a vacuum equal to half a pint of fluid. I am indebted to the kindness of Sir Philip Crampton for an apparatus made according to his model, which is represented at figs. 21 and 22. He has also favoured me with the most recent particulars of his experience in its employment, which fully confirms the belief in its utility which he expressed more than ten years ago. It is necessary to mention, that he advises that it is better to use the apparatus a day or two subsequent to the crushing, rather than at the time of the operation itself.

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* Op. Cit. p. 22.

Especially when the position of the patient's body can be easily commanded, a Heurteloup's evacuating catheter, or one which has a large opening in the *convexity*, instead of the concavity of the curve, appears to afford the best chances of success. The patient being placed in the prone position the openings are much more advantageously situated for the reception of débris suspended in the injected fluid, and are thus more readily removed from the vesical cavity. The manner of accomplishing this will be described under the head of Position. An objection may be taken by some to the catheter with an opening in the convex aspect of the curve, on the ground of an alleged possibility of the verumontanum, or some projecting portion of the tumor of the neck of the bladder being caught in it, while in transit through the urethra. Ordinary care in its manipulation, however, will render this objection nugatory. Yet inasmuch as it is necessary to have for all such instruments the stilet made as large as the cavity will admit, for the purpose already explained, the introduction of the catheter with stilet *in situ,* will render wholly impossible the occurrence of any difficulty from the source named. If any one will realize to himself, and contrast the position of the openings in the catheters described, he cannot fail to observe that, in any position of the body, the outlet is provided by the catheter with openings on its convexity or sides, at the lowest point to which the fragments must gravitate. While in the instrument in which the opening is situated on the concave aspect, the outlet is necessarily above the gravitating level, even in the healthy bladder—a position rendered doubly objectionable in the presence of prostatic enlargement.

3. The position of the patient.

The position of the body during the outflow of the injected fluid is an important element in relation to success in withdrawing calculous detritus. The best unassisted attitude of the body is doubtless that of standing, and with a gentle inclination forwards of the trunk. A better position is obtained by desiring the patient to place his hands, and rest his weight, against the wall of the apartment, or upon some projection, as the mantel-piece, while his feet are gradually removed backwards; he may thus with ease maintain for a sufficient length of time, such as a few minutes, a position of body in which its axis makes with the ground an angle of about 60°. By means of a couch, so contrived that a large opening can be made in its centre when required, a still better position is insured without disturbing the patient, or even requiring him to rise from the recumbent position after the operation. In this case he lies in the usual manner on the couch, the pelvis being raised more or less on a cushion, which may be elevated to any degree at the will of the operator. After crushing has been performed the catheter is introduced, a cushion is drawn from under him, and with it a portion of the entire thickness of the couch to which it is attached. See fig. 24, which represents a couch designed and employed by myself. The patient is requested simply to turn on his face, when the neck of the bladder becomes the most depending part, and the catheter appears through the opening resulting from the removal of the cushion. The end of the couch corresponding with the feet may be raised if necessary, and the patient thus placed in any angle required without any exertion on his own part. Injection is made into the bladder by means of a flexible tube fastened to the catheter, and the outfall takes place into a vessel below.

FIG. 24.

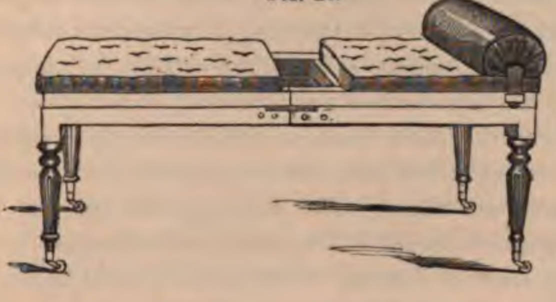

Fig. 24. The couch with pelvic cushion removed, showing the central aperture. There are two cushions—the ordinary one, level with the rest of the surface, as seen *in situ* at fig. 25; the other, much thicker, for elevating the pelvis when necessary.

FIG. 25.

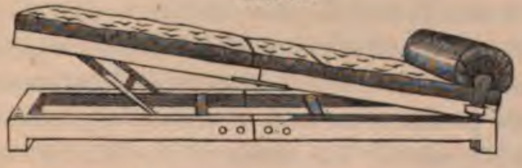

Fig. 25 shows the couch with the top raised. The entire couch is contrived so as to pack in a space of 3 feet by 2½, for the sake of portability.

By the means thus described a much freer exit is obtained, and greater success follows in the removal of fragments at the time of the operation, than is insured by the methods ordinarily followed. The advantages of such a result are too manifest to require any additional remark or illustration. There are few cases, even among those in which the bladder has lost all power of contracting, in which the influence of well-managed currents and position will not be adequate to remove the detritus resulting from an operation by lithotrity. When on the other hand, as perhaps mostly happens, we prefer to make but little attempt to remove the detritus of the stone immediately after crushing, the injecting in the prone position should still be employed subsequently; say, usually after an interval of about forty-eight hours. We may then reap the full advantage of the method described.

It is especially for those cases which exhibit unusual difficulty, as well as for those where the pain which results from the use of instruments, is more considerable than usual, that I believe we may obtain an important assistance from the following method; viz.:—

4. The injection of solvents into the bladder.

We may call to mind here the fact already stated, that the majority of formations met with in the bladder, in connection with enlarged prostate, are phosphatic in their character. And with this we may associate another fact, viz. that these, of all others, are most susceptible to the influence of chemical agents, not only on account of their own chemical constitution, but on the ground of the state of physical aggregation which they usually affect. The action of the lithotrite upon the more loosely-associated elements of these masses, as compared with the uric and oxalic compounds, produces more of powdery or granulated detritus, than of angular fragments.

The finer deposit, however, is often less readily expelled from the bladder than the smaller fragments, especially when adhesive mucus is present. But at the same time it possesses an amount of surface in the state of minute division, which offers unusual advantage for the action of fluids endowed with solvent power.

Such circumstances then, usually associated with that condition of the bladder in which it is incapable of contracting sufficiently or at all, present one of the contingencies in which the employment of solvents may be particularly useful. The chemical character of the calculus being known, as it generally is in such cases, or if not, the scoop lithotrite will obtain sufficient to determine the question, the nature of the solvent to be employed is readily decided upon.

The frequency with which the injection is used must depend of course upon the degree of sensitiveness manifested by the bladder. It may be used in two ways; either by slowly passing a stream of the solution through the viscus for some minutes daily, by means of the double current catheter, or by permitting a few ounces of the solution to remain in the bladder as long as it can be retained; or this latter method may be adopted in conjunction with the preceding.

The action of the solvent may be useful in three different ways. First, in dissolving fine detritus; secondly, in preserving the urine in an acid state, by neutralizing alkali, whether derived from that fluid, or from the mucus added to it, whenever these common complications are present, and thus preventing fresh deposit; thirdly, it may contribute to allay the pain which frequently originates from the contact of the bladder with the angular outlines of the fragments which may result from the crushing; and which become blunted and softened down under the influence of the solvent.

Much has been attempted, and some positive results have been attained, by means of chemical solutions for the destruction of calculus, wholly apart from mechanical interference. At present, however, there are perhaps few cases in which the practice can be entertained as adequate, of itself, to accomplish the desired end. But it does not follow that they should therefore be altogether thrown aside. The function which these agents should now be called on to perform, and one which would, I believe, be attended with material advantage, is that of aiding us in the exercise of the mechanical power. If ever they are to play a very important part in the surgical, as well as the medical treatment of calculus, as I cannot but believe that they will, it will probably not be until the initiatory step has been taken of employing them first as adjuncts to the present method. Granted that they may exercise some influence upon a calculus in its integral state, as has often been proved, how much greater should be the result of their action when exerted upon the detritus which results from crushing. How often do we find that, after two or three applications of the lithotrite, in which considerable progress has been made, we are compelled to wait for a season, owing to the increased sensibility of bladder that has been occasioned, during which no further efforts are made, no progress is accomplished, valuable time is often lost, and the patient's courage begins to fail. During a portion of this time, the use of appropriate solvents might at all events continue the work begun, if not in some circumstances complete it altogether.

This idea of combining the chemical and mechanical forces in the destruction of calculus has been a recent one to myself, and since entertaining it, I have not met with a case in which to give it a fair trial. I shall employ an early opportunity of doing so, believing that it will contribute in some material degree to our success in the treatment of that large and most important section of urinary maladies, which is constituted by vesical calculus. For I see no reason why the action of the solvent might not become available in many cases of lithotrity, selecting that agent which is appropriate to the formation to be removed. There can be no doubt that, on the effectual withdrawal of the fragments, the success of the operation greatly depends; and anything which offers an additional facility in promoting this end must be regarded as so much clear gain in practice. On this subject I may quote a well known and high authority, who, in the following extract, does but express, I believe, the conviction of all who have practically studied the art of lithotrity.

"The reduction of the calculus into fragments does not complete the work of the surgeon. The discharge of these fragments, and of the detritus, *must be promoted with the least possible delay*. Upon this point I would lay great stress, for experience has convinced me that nearly all the consecutive accidents of lithotrity are determined by the quantity or irritating nature of the detritus, which may be left behind in the bladder after the first operation, and which this organ has been unable to expel. The most simple, and at the same time effectual, mode of promoting the discharge of detritus is washing out the bladder repeatedly with tepid water."*

To this recommendation I would add, with confidence, let the water of those repeated injections be impregnated with a small quantity of the chemical reagent indicated, and let a small portion of the fluid be left in the bladder between each application. It is needless to say that the quantity of the reagent employed should, on the first trial, be so small that no possibility of irritating the bladder can occur, after which gradual additions may be made as they can be borne. From the prolonged application of the agent, still greater effect may be looked for. Dr. Willis suggested "a reservoir for the fluid raised a foot or two above the bed or sofa on which the patient is laid, and to connect this by means of a flexible tube guarded by a stop-cock, with a double-current catheter. In this way, a constant stream of the injection can be kept circulating through the bladder, and acting on the stone to the very best advantage. The reservoir should be a double vessel of tinned iron, the outer one being filled with water at from 95° to 98° Fahrenheit, and kept at this temperature by means of a small spirit lamp. There is no necessity for any very rapid current through the bladder."[*]

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* Diseases of Bladder, &c. By W. Coulson. 5th ed. p. 469.

What are the agents, and what the formulæ, which may be employed for the purpose proposed?

The alkalies formerly enjoyed a large reputation as efficacious agents for the purpose; and perhaps might, in absolute ignorance of the nature of the calculus, in the majority of all cases, be more generally useful than any other. The predominance of uric acid formations, whether alone or associated with bases, is a fact of itself sufficient to support this statement.[†] But it is not improbable that even some

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[*] On the Treatment of Stone in the Bladder by Medical and Mechanical Means. London, 1842, p. 179.

[†] In the early history of the use of solvent remedies against stone, the alkalies appear to have formed the basis of the agents employed. Crollius, in his "Basilica Chymica," Frankfort, 1608, recommends salt of tartar in infusion of parsley, also mixtures in which lime was the principal ingredient; although for others the sulphuric and hydrochloric acids.—*Vide* pp. 117-166, 220, 247. Daniel Sennertus, in his "Praxis Med.," not only mentions the internal use of the alkalies, but advises them to be injected into the bladder by a catheter.—1650. Lib. iii. Part viii. § 1, cap. ii. Other writers at this time also refer to them. Boerhaave tells us that Val. Basil, in the fifteenth century, advised for the solution of stone the internal use of an alkaline salt made from vine cuttings.—*Elem. Chimiæ*, vol. ii. p. 53. 1732.

But a new impetus was given to inquiry by the fame of Mrs. Joanna Stephens' practice, the secret of which was purchased by Parliament in 1739 for £5000. The agents in this case were alkaline, usually salts of potash and lime. Great interest in the subject was excited, and numerous trials made, in which enormous quantities of alkali, chiefly uncombined potash largely diluted, were administered both by mouth and by injection into the bladder. In rare instances, the calculus appears to have been removed; in numerous others, the effects were palliative to a very considerable extent. Among phosphatic calculi have been in some degree disintegrated by this class of agents, probably by their action on the animal matter which cements together the calcareous particles. Nevertheless, from their influence in determining the precipitation of phosphatic salts from the urine, they must be regarded as contraindicated in these cases. Indeed it is not impossible to induce the formation of a phosphatic deposit upon a pre-existing uric acid calculus, by employing too freely, or too continuously, the use of alkalies, for its solution. And there is little doubt during the extensive employment of soap and lime-water for this purpose, which was made in this country about a century ago, that not only numerous patients, but medical men also, sometimes mistook the phosphatic salts which were precipitated from the urine by the remedy, for the result of its disintegrating action on the calculus.*

But, as has before been shown, the calculus associated

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the numerous authors who subsequently wrote on this subject, the following are some of those that give the best and most accurate information:—Hartley, who modified and improved Mrs. Stephens' plan, 1739; Hales, 1740; Butter, Edinburgh, 1754; Whytt, Edinburgh, 1755. See also Dr. Rutty's paper at the Royal Society, 1741; two practical essays by Alex. Blackrie, London, 1766–71; also, N. Hulme, 1788.

Dr. Lobb, in 1739, had prescribed lemon-juice largely, and vegetable diet; Dr. M. Dobson, 1779, "fixed air" and alkalies. Spallanzani proposed gastric juice as a solvent.—"Experiences sur la Digestion." Paris, 1783. So also did Dr. Darwin and others. Subsequently Drs. Physick and Dorsey made numerous experiments on calculi with this agent: the latter tried it in a case of stone in the bladder for a short time, with a partial success, but does not state why he did not persevere.—See Dorsey's work on the lithontriptic virtues of the gastric liquor. Phil. 1802.

In France, at an early date, the alkaline remedies were strongly recommended; by Darcet, "Annales de Chimie," in 1726; and Pierre Desault, 1736. By Fourcroy and Vanquelin; and more recently by C. Petit, 1834. The first and last-named employed the Vichy waters. See also a report of the Royal Academy of Medicine of Paris upon these agents for numerous cases.—Bulletin d'Academie; tome iii. 1839. P. Desault recommended injections and baths of Bareges water for the same purpose.

* This was seen by later writers than the above named. See Dr. Austin's "Gulstonian Lectures," 1791; Murray Forbes, 1793, and others, who point out this source of error.

with enlarged prostate is, in most instances, phosphatic. The examination of a fragment after the first crushing will, however, determine the question. Supposing it to be so, the agent to be selected may be one of the mineral acids which combine with the calcareous bases, and form soluble salts. Of these the nitric has hitherto been esteemed the best.

Sir Benjamin Brodie's case, in which two phosphatic calculi were removed from a diseased bladder by this means, is well known. He employed from two to two and a half minims of strong nitric acid to the ounce of distilled water, which solution was allowed very slowly to pass through the bladder by means of a double-current catheter, for a period of fifteen to thirty minutes every two or three days. From this case he draws the following conclusions:—

"1. That a calculus, composed externally of the phosphates, may be acted on by this injection so as to become gradually reduced in size, while it is still in the bladder of a living person.

"2. That there is reason to believe that small calculi, composed throughout of the mixed phosphates, such as are met with in some cases of diseased prostate gland and bladder, are capable of being entirely dissolved under this mode of treatment." *

Such being the power of chemical solvents on the unbroken stone, it cannot be doubted that their efficacy would be increased tenfold when applied after the stone had been reduced to fragments. Hence their employment must be regarded as particularly applicable to those cases now under consideration, presenting, as they so frequently do, an atonied state of bladder inimical to the due expulsion of its foreign contents; cases in which a return of the complaint is more to be dreaded, and the more carefully to be guarded against.

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* Op. Cit. pp. 306–311.

The agents which have been referred to, act by their elective affinity for the base of the salt which forms the calculus. From their very nature, they tend also to act as irritants upon the mucous membrane of the bladder. Hence the necessity to sacrifice power by greatly diluting them, and thus to render the chemical action much slighter than it would be, could they be used in a more concentrated form. Attempts have consequently been made to discover an agent which should exert no injurious effect on the bladder, but at the same time possessed of considerable power to disintegrate the stone. Dr. S. Elliott Hoskins of Guernsey has endeavoured to effect this by securing a double chemical decomposition in the bladder, by means of an agent sufficiently unirritating to be retained there almost for an indefinite period of time. The first published account of his experiments is to be found in a paper which was presented to the Royal Society in 1843.*

The distinction which he there draws between SOLUTION and DECOMPOSITION is important. The *solvent* acts on the calculus, and on the tissues; the *decomponent* only on the calculus. The explanation of these actions may be given in the author's own words: "the active agent of the decomponent is liberated gradually, and neutralized by the earthy bases of the calculus, before it can come in contact with the living tissues; * * * The *base* of the decomponent unites with the *acid* of the calculus, while the acids of the former combine, and form soluble salts, with the bases of the other. The combined acids are set free in definite proportions, neutralized in their nascent state, and removed from the sphere of action before any stimulating effect can be exerted on the bladder." †

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* Phil. Trans, 1843, p. 7.

† Decomposition of Phosphatic Calculi.—Lond. Jour. Med. 1851, vol. iii. p. 891. By S. Elliott Hoskins, M.D., F.R.S.

The agent employed by Dr. Hoskins in several cases reported was the nitro-saccharate of lead, which he recommended to be employed in the following manner. To each fluid ounce of water is to be added, one grain of the salt previously dissolved in five minims of strong acetic acid. The mixture to be heated to the boiling point, and subsequently used at 100° Fahrenheit. A few ounces are to be injected, permitted to remain ten or fifteen minutes, and renewed two or three times if thought proper, at each application.

Very recently Dr. Hoskins has informed me that further experience has, in some measure, modified his plan. He writes me as follows: "The salt which I have, in some more recent cases, had recourse to is the pure acetate of lead (one grain to the ounce of water), with the smallest possible quantity of acetic acid, and no more, that is, sufficient to secure solution, and render the liquid transparent." In this liquid, which is perfectly unirritating, very rapid decomposition of a phosphatic calculus will take place, as may be easily demonstrated by experiment. If a fragment be suspended in a small quantity of the solution, a dense white and very fine precipitate of phosphate of lead immediately occurs, and an acetate of the base or bases is formed in solution. I injected this liquid, in two cases, in presence of phosphatic stone without producing irritation, and when expelled it deposited the insoluble precipitate of phosphate of lead; but both were cases in which there was no indication for depending on solvents; in one, the calculus being too large for lithotrity; in the other, it was readily removed by that method. The valuable result obtained, therefore, was its innocuous character as regards the soft parts involved, a matter of no small importance.

The impaction of fragments in the urethra may sometimes be a source of difficulty, although less commonly in these cases than in younger subjects, in whom the action of the bladder is vigorous; particularly in those who, whatever their age, exhibit irritability or spasm of the viscus after operation. The consideration of this subject at length is not within the scope of my design. When situated far back, as in the prostatic part, perhaps the best proceeding is to push them gently towards the bladder with a large wax bougie, or by means of a strong injection of water passed through a catheter, which has been carried down to the spot. Painful sensations about the neck of the bladder, and frequent desires to make water, appearing a day or two after a sitting, are not unfrequently caused by the lodgment of a small fragment in that situation, although it may be insufficient to interfere with the flow of urine. At all events, the passage of a *full-sized* instrument, the best for the purpose being a soft flexible bougie, will sometimes remove all these symptoms, and probably by carrying such a fragment back into the bladder. This is a point in the after treatment which Civiale recommends the operator never to forget.

Mr. Skey speaks in high terms of the use of a catheter of the largest size, " the lower end of which is cut off, and the rounded extremity supplied by a round knob or ball, connected by a wire to the handle. When," says he, "the instrument strikes the fragment, the ball is withdrawn, and by forcing on the catheter little by little, the stone is pushed back into the bladder, the sharp circle of the catheter surrounding the fragment, while its large size fully distends the canal." *

The employment of the long urethral forceps, of the long curette, or of the small lithoclast, will usually suffice to remove fragments which are impacted in the anterior and middle portions of the passage.

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* Clin. Lect. on Lithotrity.—*Lancet*, vol. i. 1855, p. 554.

There is one condition liable to be encountered in a case of prostatic enlargement complicated with calculus, which remains to be noticed, and the consideration of which may appropriately close this chapter. It is the existence of extreme irritability on the part of the prostate, or of the bladder itself. This condition, if insuperable, certainly contraindicates the application of lithotrity. The necessary manipulation would not only be distressingly painful, but fraught with danger to the patient. Cystitis would, probably, be produced, and might soon prove fatal, or extension of inflammation to the kidneys might follow, and death occur from disorganization of these organs, already perhaps impaired by chronic disease. When, however, the irritability is purely local, that is, when it consists only in an irritated condition of the prostate and bladder, unassociated with renal disease, much may be done in the way of preparing the patient, and we may even then succeed in rendering him a fit subject for lithotrity. Preparatory measures are desirable in most cases; in many necessary; in these they are especially effective.

We should commence with soothing means, enjoining rest, attention to the condition of the urine, the employment of acids or alkaline salts, combined with those infusions which the nature of the case indicates as most appropriate (page 115). The judicious use of hip baths, thorough friction to the surface of the skin, attention to the digestive functions and state of the bowels, with the regulation of the diet, and sedatives by the rectum or otherwise, will often exert a very beneficial influence on the state of the patient. Besides these, the condition of the bladder and its contents must be carefully watched; and either by ensuring from time to time, as often as is necessary, that the viscus is completely emptied, or by the use of soothing injections and other local treatment, which may be indicated, all sources of discomfort and irritation should, as far as possible, be removed.

If the patient has not been accustomed to the employment of instruments in the urethra, he should, when the irritability of the organs has been diminished, be gradually accustomed to the presence of a catheter in the canal, until a full-sized instrument passes with comparative ease, and its presence there for two or three minutes ceases to excite pain, or much irritation, or other unpleasant consequence. The time and attention of the surgeon is well bestowed in such preliminary treatment; and, although sometimes necessarily tedious in an obstinate case, is generally well repaid by the successful issue which it tends so much to ensure. Under such measures, large discharges of mucus may almost disappear, difficulty and exhausting suffering in the act of micturition be greatly mitigated, a disposition to hæmorrhage removed, and the general power of the patient wonderfully recruited. In those cases which appear at the outset most unpromising, we should, nevertheless, try the effect of the measures described, since, with whatever result, so far as the anticipation of lithotrity is concerned, they can scarcely fail to be, to some extent, beneficial; and we should only relinquish the hope of applying that operation on discovering that it is not within our power thus to effect a considerable amelioration of the patient's condition. It then becomes a question whether future treatment should be merely palliative, or whether he should be submitted to the alternative of lithotomy. If, after all our efforts, the symptoms are but little improved, especially if the preliminary use of instruments is followed by severe rigors or fever, and the signs of inflammation in the bladder are so produced or augmented, we may not run the hazard of attempting to crush a calculus. Better is it, under such circumstances, to choose a fitting time to rid the sufferer of his complaint, by one operation adequate to its complete removal, than to expose him to the tedious course of repeated and painful efforts, which such a state of bladder would render inevitable, granting even the possibility of the application.

In *all* cases of lithotrity we shall do well to adopt certain preliminary measures, and to attain for our patient as good a state of health generally, and as quiet a condition of the urinary organs particularly, as we can accomplish, before entering upon the operation properly so called. The use of instruments as a preparatory measure, so strongly recommended by Civiale, is undoubtedly important, as I have had some opportunities of observing. The susceptibility to constitutional irritation as the result of instrumental interference with the urethra and bladder, which some individuals exhibit in a marked degree, apparently as an inherent peculiarity, and to which all are, under certain circumstances, more or less liable, may be greatly diminished by gradually accustoming the passages to contact with foreign bodies, through the progressive steps of soft bougie, catheter, and lithotrite. Where this peculiar susceptibility exists, evinced by the occurrence of rigor, or other disturbance of the nervous system, after the use of solid instruments especially, no sign of organic disease being present, we cannot be too careful to adopt the precautions recommended. Where, on the other hand, unmistakable signs of renal disease are present, little else but harm will accrue to the patient, as a rule, from the employment of lithotrity.

Supposing, however, that, for the present at all events, the employment of operative measures is not to be entertained, much may be done by purely palliative treatment. Conjoined with this we should apply, so far as we may be able, and in any manner in which they can be borne, either locally or through the system, the agents calculated to produce a disintegration of the stone. Whatever may be the amount of the action so exerted upon it, there can be no question as to the relief to painful symptoms, which is afforded by a perseverance in the use of diluents, containing in solution the acid, saline, or alkaline agents which the case may require. We possess the best evidence, and in great abundance, from sources already referred to, in support of this opinion. I believe that such a mode of treatment has been of late too much neglected, a result probably of the great advance in the surgical or mechanical treatment which the last century has witnessed. And there appear to be good grounds for anticipating that its employment might still be exceeding beneficial in the management of those cases occurring in elderly patients who are judged unpromising subjects for the performance of any operation.

INDEX.

PAGE
Abscess of prostate, acute . . 204
of prostate, chronic . . 207
treatment of . . . 206
Acute prostatitis . . . 193
causes of 194
symptoms 197
treatment 198
Action of stone solvents . . 303
Acids, mineral 126
Acid, benzoic 129
Adams, Mr., on alkalies . . 134
on abscess 207
Alkalies, action of, on calculus . 306
Alkaline remedies . . . 126
Dr. O. Rees on . . . 127
in vesical hæmorrhage . 134
Ammonia, hydrochlorate of . 145
Amussat on causes of enlargement 55
Analysis of concretions . . 262
of calculi 272
Analysis of examination of fifty prostates 66
Analysis of Tanchou's cases . 214
Apparatus for injecting bladder, new 296
Appreciation of remedies . . 123
Astringents in vesical hæmorrhage 134
Bar at neck of bladder . . 239
Guthrie on 240
Civiale and Mercier on . 242
Gross and others . . 243
consideration of . . . 244
conclusions respecting . 250
treatment of . . . 251
Barker, T. H., Dr., case by . . 273
Baths, hip, of Kreuznach water . 151
hot 200
Bayle on tumors of uterus . 44

PAGE
Bell, Sir C., on causes of enlargement 54
Benzoin 121
Bladder, puncture of . . 182
Brander, Dr., on puncture through symphysis pubis . . 184
Bromine and its combinations . 153
in Krenznach waters . . 151
Brodie, dissections by . . 5
on buchu 115
on pareira brava . . . 116
on uva ursi 118
on hæmorrhage . . . 137
on difficult catheterism . 177
sounding for stone . . 283
lithotrity in enlarged prostate 288
solvents for calculi . . 308
Buchu 115. 121
Calculus, vesical, with enlarged prostate . . . 277
frequent occurrence of . 278
history of 280
sounding for . . . 282
lithotrity for . . . 286
solvents in 306
Calculous fragments, removal of by scoop lithotrite . 294
by evacuating catheter . 295
by exhausting apparatus . 297
by position . . . 300
by solvents 302
Calculi, prostatic . . . 271
analysis of 272
numerous cases of . . 274
operations for . . . 275
Cancer of prostate . . . 212
cases of 220
table of 230
Cases of tumors of prostate . 46

PAGE
Cases of cystitis, &c. . . . 129
  of puncture of bladder . 186
  of chronic abscess of prostate 208
  of cancer of ditto . . 220
  of tubercle of . . . 234
  of cysts of 237
  of prostatic calculi . . 274
  of lithotrity in enlarged prostate . 289, 290. 292. 297
Catheter, mode of passing in enlarged prostate . . 172
  tying in a, question of . 111
  different forms of . . 169
  flexible and solid . . 171
  mode of passing . . 172
  mode of passing the angular 177
Catheterism by patient himself . 109
  mode of performing . . 172
  in difficult cases . . . 173
  gentle manipulation in . 176
Chimaphila 120
Chios turpentine . . . 121
Chronic abscess of prostate . 207
  cases of 208
Chronic cystitis 113
  remedies for . . . 115
Chronic prostatitis . . . 201
  treatment of . . . 202
Citrate of potash . . . 128
Civiale on causes of enlargement 56
  on catheterism . . . 176
  on bar at neck of bladder . 242
  sounding for stone . . 285
  lithotrity in enlarged prostate 290
  impaction of fragments in urethra . . . 311
Coagula in the bladder . . 136
Combination of remedies . . 124
Complication of stone and enlarged prostate . . 278
Compression, as a remedial agent 154
  used by Physick . . . 155
  used by Leroy D'Etiolles . 155
  instrument for . . . 159
  method of employing it . 161
Conclusions on treatment of retention . . . 191
  respecting bar at neck of bladder . . . 250
Concretions, prostatic . . 259
  description of . . 260
  analysis of . . . 262
  Jones and Quekett on . 268
Congestion of enlarged prostate 138
  treatment of . . . 139

PAGE
Cooper, S., on causes of enlargement 54
Couch, new, for lithotrity . . 300
Coulson on buchu . . . 115
  pareira brava, &c. . 117, 118
  benzoin 122
  hemlock 145
  lithotrity in enlarged prostate 289
  removal of calculous fragments 304
Crampton, Sir P., on lithotrity in enlarged prostate 289. 297
  exhausting apparatus . . 297
Crushing of outgrowth from prostate . . . 164
Cruveilhier on tumors of prostate 34
Curves, various, for catheters . 169
Cystitis, chronic . . . 113
Daucus carota 120
Decomposition of calculi . . 309
Demulcents 122
Detritus calculous, removal of . 294
Deviations in form of urethra . 23
Diagnosis of prostatic enlargement 92
  mode of conducting by rectum 93
  mode of conducting by urethra 96
  best instruments for . . 98
  tumors in bladder . 100. 103
  projecting in urethra . . 101
  from stricture of urethra . 102
  from calculus . . . 102
  from chronic cystitis . . 103
  from atony of the bladder . 104
  from paralysis . . . 104
  of acute prostatitis . . 198
  of malignant disease of prostate 219
  of tuberculosis of ditto . 232
Diet and regimen of patients . 140
Division of prostate . . . 163
Effects of enlarged prostate on micturition . . . 82
Effects of prostatic enlargement on bladder and kidneys 90
Elevation of the neck of the bladder . . . 89
Ellis on conformation of prostate 13
  on structure of uvula . 248
Employment of solvents in vesical calculus . . 306
Encephaloid of prostate . . 214
Enemata opiate 132

PAGE
Engorgement of bladder with urine produces overflow . . . 83. 87
  the common result of enlarged prostate . . 83
Enlargement of prostate not a natural result of age . 65
Epigœa repens 120
Evacuating catheter, in lithotrity 295
Excision of bar at neck of bladder 255
Exercise 142
Exhausting apparatus in lithotrity 297
Forms, various, of catheter . 169
Formulæ for suppositories . . 132
Fragments, calculous, removal of 294
Fusible calculus, how formed . 281
Gross on size of the prostate . 11
  on causes of enlargement . 55
  on buchu 115
  on pareira brava, &c. 117, 118. 125
  on bar at neck of bladder . 243
Guthrie, Mr., on bar at neck of bladder . . . 240
Hæmorrhage into the bladder . 133
  treatment of . . . 134
Hemlock 144
Hip-baths, hot . . . 114. 200
  medicated 151
History of solvent remedies for calculus . . . 306
Hodgson, Dr., on size of the prostate . . . 11
Home on "third lobe" . . 5
  on enlargement of lateral lobes 24
  on causes of enlargement . 53
Hops, infusion of . . . 125
Hoskins, Dr., on decomposition of calculi . . . 309
Howship and Travers' cases of cancer . . . 215
Hunter on "third lobe" . . . 9
  on causes of enlargement . 52
Hydatids of prostate . . . 236
  cases 237
Hypertrophy and dilatation of bladder 90
Impaction of fragments after lithotrity . . . 310
Incisions of bar at neck of bladder . . . 253
Incontinence of urine . . 82
  the term often misapplied . 83
  confounded with engorgement and overflow . 87

PAGE
Incontinence of urine very rare in prostatic enlargement 27. 88
  treatment of . . . 138
Induration of prostate chronic . 202
Injecting apparatus, new . . 296
Injecting the bladder in cystitis 133
Injection of solvents for stone . 302
Iodine, and its combinations . 146
  Stafford's treatment by . 146
  in enemata . . . 152
  in suppositories . . . 153
Irish moss 122
Irritability of the bladder . . 87
  treatment of . . . 131
Ivanchich, Dr., on lithotrity in enlarged prostate . 292
Jones, Dr., on enlargement of prostate . . . 33
Kölliker on structure of prostate 14
Kreuznach waters . . . 149
  analysis of 151
  mode of using . . . 151
  Dr. Prieger on . . . 149
Lawrie, Dr., on a perineal operation 190
Leory D'Etiolles, the sound of . 99
  instruments for compressing prostate . . . 155
  instrument for ligature of ditto 164
Ligature of outgrowth from prostate . . . 165
Liston's practice of perforating prostate . . . 181
  instrument for . . . 188
Lithotomy in enlarged prostate 285
Lithotrity in enlarged prostate 286
  Sir B. Brodie on . . 288
  Mr. Coulson on . . . 289
  Sir P. Crampton on . . 289
  Civiale on 290
  Dr. Ivanchich . . . 292
Lythrum salicaria . . . 119
Malignant disease of prostate . 212
  less rare than supposed . 213
  symptoms of . . . 217
  treatment of . . . 220
  cases of . . . 221. 230
Marsh-mallows 122
Matico 119. 137
Mercier on causes of enlargement 56
  on paralysis of bladder . 84
  on incontinence . . 88
  the sound employed by . 99
  instrument for compression 156

PAGE
Mercier on angular catheters . 169
  mode of employing them . 177
  on bar at neck of bladder . 242
  treatment of . . . 254
Mercury 145
Mineral acids 126
Mode of passing catheters. . 172
Moral treatment . . . 143
Morgagni on "third lobe" . 7
Mucous discharge from bladder, nature of . . . 76
New couch for lithotrity . . 300
Objections to lithotomy . . 285
  to lithotrity . . . 286
Opiates, value of . . . 131
Overdistention, or atony of the bladder . . . 86
  diagnosis of . . . 104
Overflow of urine from a distended bladder . . 74
  often mistaken for incontinence . . . 87
  indicates retention, not incontinence . . . 87
Palliative treatment of calculus 312
Paralysis of the bladder . . 83
  uncommon unless traumatic 84
  diagnosis of . . . 104
Pareira brava . . . 116. 124
Perforation of prostate . . 181
  instrument for . . . 189
Perineal abscess . . . 207
Perineal operation of Lawrie . 190
Period at which enlargement takes place . . . 67
Position, effect of, in removing calculous fragments . 300
Preparation for lithotrity . . 314
Proportion of enlarged to healthy prostates after fifty years . . . 65
Prostatitis, acute . . . 193
  causes of . . . 194
  symptoms 197
  treatment 198
  chronic 201
Prout, Dr., on uva ursi, &c. 115. 117
Puncture of bladder, suprapubic 182
  rectal 183
  through symphysis pubis . 184
Question of emptying bladder . 177
  of retaining catheter . . 180
Rectum, puncture of bladder by 183. 186
Rees, Dr. O., on alkalies . . 127
Regimen and diet . . . 140

PAGE
Remedies, appreciation of . . 124
  combination of . . . 124
  balsamic 121
  diuretic 121
  demulcent 122
  acid 126
  alkaline 126
Removal of prostatic concretions 275
  of calculous fragments . 294
Retention of urine almost always the result of organic obstruction . . . 84
  treatment of . . . 166
  catheterism in . . . 168
  operations for . . . 181
  conclusions respecting . 191
Schirrus excessively rare . . 215
Sedatives 132
Simpson, Dr., on prostate and uterus 41
Skey, Mr., on removal of fragments 311
Slippery elm, the . . . 123
Solvents for calculus . . . 302
  their employment, history of 306
Sounding for stone, best mode of 282
Stafford's treatment . . . 146
  cases 147
Stone in the bladder, with enlarged prostate . . 278
Suppositories 131
Suppuration of prostate . . 204
Symphysis pubis, puncture through . . . 184
Symptoms of enlarged prostate 69
Table of weights, &c., of thirty-three healthy prostates 17
  of seventeen abnormal ditto 18
  of cases of cancer . . 230
  of cases of tubercle . . 234
  of cases of lithotrity . . 292
Tabular view of results of prostatic enlargement . 86
Tanchou's tables of cancer . 212
Treatment of senile enlargement 106
  to obviate results of . . 107
  and general management of patients . . . 139
  special, against enlarged prostate . . . 144
  of chronic cystitis . . 113
  of hæmorrhage . . . 133
  of retention of urine . . 166
  of malignant disease . . 220

PAGE

Treatment of tubercular disease 232
- of bar at neck of bladder . 251
- of calculus with enlarged prostate . . . 285

Tubercle of prostate 231
- treatment of 232
- anatomy of 233
- cases of 234

Urethra, effects upon of enlarged prostate 23

Urinary retention 166
- catheters for 168
- puncture for 182

PAGE

Urinary retention, conclusions respecting 191

Urethra, impaction of fragments in, after lithotrity . 311

Urine, characters of 76

Uva ursi 117. 124

Varieties of prostate-catheter . 169

Virchow on concretions . . 270

Walshe, Dr., on cancer of prostate 214

Wedl on concretions 270

Willis, Dr., on solvents . . 305

Wilson on causes of enlargement 53

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TO

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ANATOMY.

PAGE
Anatomical Remembrancer .. 3
Beale on Liver .. 4
Hassall's Micros. Anatomy .. 14
Holden's Human Osteology .. 15
Jones' and Sieveking's Pathological Anatomy .. 17
Maclise's Surgical Anatomy .. 19
Paget's Catalogue .. 21
Sibson's Medical Anatomy .. 25
Toynbee's Catalogue .. 28
Wheeler's Handbook .. 30
Wilson's Anatomy .. 31

CHEMISTRY.

Abel & Bloxam's Handbook .. 4
Bowman's Practical Chemistry 7
Do. Medical do. .. 7
Fownes' Manual of Chemistry .. 12
Do. Actonian Prize .. 12
Do. Qualitative Analysis .. 12
Do. Chemical Tables .. 12
Fresenius' Chemical Analysis .. 12
Galloway's First Step .. 12
Do. Analysis .. 12
Do. Diagrams .. 12
Griffiths' Four Seasons .. 13
Horsley's Chem. Philosophy .. 16
Jones.—Mulder on Wine .. 17
Odling's Practical Chemistry .. 21
Plattner on Blowpipe .. 22
Speer's Pathol. Chemistry .. 25

CHOLERA.

Acland on Cholera at Oxford .. 3
Baly and Gull—Reports .. 4
Snow on Cholera .. 25

CLIMATE.

Francis on Change of Climate .. 12
Hall on Torquay .. 14
Haviland on Climate .. 15
Lee on Climate .. 18
Martin on the Undercliff .. 19
Martin (J. R.) on Tropical .. 20

DEFORMITIES, &c.

Bishop on Deformities .. 6
Do. Articulate Sounds .. 6
Brodhurst on Spine .. 7
Do. on Clubfoot .. 7
Hare on Spine .. 14
Inman on Spine .. 16
Tamplin on Spine .. 27

DENTISTRY.

PAGE
Blundell's Painless Extraction . 6
Clark's Odontalgist .. 8
Gray on the Teeth .. 13

DISEASES of the URINARY and GENERATIVE ORGANS, and SYPHILIS.

Acton on Reproductive Organs 3
Do. Urinary and Generative Organs .. 3
Coote on Syphilis .. 9
Coulson on Bladder .. 10
Do. on Lithotomy .. 10
Egan on Syphilis .. 11
Judd on Syphilis .. 17
Milton on Gonorrhœa .. 20
Parker on Syphilis .. 22
Todd on Urinary Organs .. 28
Wilson on Syphilis .. 31

DISEASES OF WOMEN AND CHILDREN.

Bennet on Uterus .. 5
Do. on Uterine Pathology .. 5
Bird on Children .. 6
Brown on Women .. 7
Do. on Scarlatina .. 7
Eyre's Practical Remarks .. 11
Hood on Crowing .. 16
Lee's Ovarian and Uterine Diseases .. 18
Lee on Diseases of Uterus .. 18
Roberton on Women .. 24
Rowe on Females .. 24
Smith on Leucorrhœa .. 25
Tilt on Diseases of Women .. 27
Do. on Change of Life .. 27
Underwood on Children .. 28
West on Women .. 29
Whitehead on Abortion .. 30

HYGIENE.

Beale's Laws of Health .. 5
Do. Health and Diseases .. 5
Blundell's Medicina Mechanica 6
Carter on Training .. 8
Cornaro on Long Life .. 9
Hartwig on Sea Bathing .. 14
Do. Physical Education 14
Hufeland's Art .. 16
Lee's Watering Places of England 18
Do. do. Germany, France, and Switzerland .. 18
Lee's Rhenish Watering Places 18
Robertson on Diet .. 23
Roth on Movements .. 24
Rumsey's State Medicine .. 24
Van Oven's Decline of Life .. 29
Wilson on Healthy Skin .. 31
Do. on Mineral Waters .. 31

MATERIA MEDICA and PHARMACY.

PAGE
Bateman's Magnacopia .. 4
Beasley's Formulary .. 5
Do. Receipt Book .. 5
Do. Book of Prescriptions 5
Lane's Materia Medica .. 17
Pereira's Selecta e Præscriptis 22
Pharmacopœia Londinensis .. 22
Prescriber's Pharmacopœia .. 22
Royle's Materia Medica .. 24
Spurgin's Materia Medica .. 26
Squire's Pharmacopœia .. 26
Steggall's Materia Medica .. 26
Do. First Lines for Chemists 26
Stowe's Toxicological Chart .. 26
Taylor on Poisons .. 27
Wittstein's Pharmacy .. 31

MEDICINE.

Adams on Rheumatic Gout .. 4
Addison on Cells .. 3
Alexander on Rheumatism .. 3
Arnott on a Local Anæsthenic 3
Barclay on Diagnosis .. 5
Barlow's Practice of Medicine 4
Billing's First Principles .. 5
Bird on Charcoal .. 6
Brinton on Ulcer .. 7
Budd on the Liver .. 7
Do. on Stomach .. 7
Chambers on Digestion .. 8
Davey's Ganglionic .. 10
Eyre on Stomach .. 11
Fuller on Rheumatism .. 12
Gairdner on Gout .. 12
Garrett on E. and N. E. Winds 13
Granville on Sudden Death .. 13
Gully's Simple Treatment .. 13
Habershon on Stomach .. 14
Hall on Apnœa .. 14
Hall's Observations .. 14
Harrison on Lead in Water .. 14
Headland on Medicines .. 15
Hooper's Medical Dictionary .. 16
Hooper's Physician's Vade-Mecum .. 13
Jones (H.) on the Stomach .. 16
Lugol on Scrofula .. 19
Peacock on Influenza .. 22
Pym on Yellow Fever .. 23
Robertson on Gout .. 23
Savory's Compendium .. 24
Semple on Cough .. 24
Shaw's Remembrancer .. 25
Steggall's Medical Manual .. 26
Do. Gregory's Conspectus 26
Do. Celsus .. 26
Thomas' Practice of Physic .. 27
Wegg's Observations .. 29
Wells on Gout .. 30
What to Observe .. 19
Whitehead on Transmission .. 30
Williams' Principles .. 30
Wright on Headaches .. 30

CLASSIFIED INDEX.

MISCELLANEOUS.

	PAGE
Acton on Prostitution	3
Atkinson's Bibliography	4
Bascome on Epidemics	4
Bryce on Sebastopol	8
Cooley's Cyclopædia	9
Forbes' Nature and Art in Disease	12
Gully on Water Cure	13
Guy's Hospital Reports	13
Lane's Hydropathy	18
Marcet on Food	19
Massy on Recruits	20
Oxford Editions	21
Part's Case Book	22
Pettigrew on Superstitions	22

NERVOUS DISEASES AND INDIGESTION.

Anderson on Nervous Affections	3
Arnott on Indigestion	3
Carter on Hysteria	8
Child on Indigestion	8
Downing on Neuralgia	11
Hunt on Heartburn	16
Lobb on Nervous Affections	19
Radcliffe on Epilepsy	23
Reynolds on the Brain	23
Rowe on Nervous Diseases	24
Sieveking on Epilepsy	25
Todd on Nervous System	28
Turnbull on Stomach	28

OBSTETRICS.

Barnes on Placenta Prævia	4
Copeman's Records	9
Crosse's Midwifery	10
Lee's Clinical Midwifery	18
Pretty's Aids during Labour	23
Ramsbotham's Obstetrics	23
Do. Midwifery	23
Smellie's Obstetric Plates	25
Smith's Periodoscope	25
Swayne's Aphorisms	26

OPHTHALMOLOGY.

Cooper on Near Sight	9
Dalrymple on Eye	10
Dixon on the Eye	11
Holthouse on Strabismus	15
Do. on Impaired Vision	15
Jacob on Eye-ball	16
Jones' Ophthalmic Medicine	17
Do. Defects of Sight	17
Do. Eye and Ear	17
Nottingham on Conical Cornea	20
Walton on Ophthalmic	29

PHYSIOLOGY.

	PAGE
Carpenter's Human	8
Do. Comparative	8
Do. Manual	8
Cottle's Human	10
Hilton on the Cranium	15
Richardson on Coagulation	23

PSYCHOLOGY.

Burgess on Madness	7
Burnett on Insanity	7
Conolly on Asylums	9
Davey on Nature of Insanity	10
Hood on Criminal Lunatics	16
Jacobi on Hospitals, by Tuke	28
Knaggs on Criminal Lunatics	17
Millingen on Treatment of Insane	20
Monro on Insanity	20
Do. Private Asylums	20
Noble on Psychology	20
Williams (J.) on Insanity	30
Williams (J. H) Unsoundness of Mind	30
Winslow's Lettsomian	31
Do. Law of Lunacy	31

PULMONARY and CHEST DISEASES, &c.

Addison on Healthy and Diseased Structure	3
Billing on Lungs and Heart	5
Blakiston on the Chest	6
Bright on the Chest	7
Cotton on Consumption	10
Do. on Stethoscope	10
Davies on Lungs and Heart	11
Fenwick on Consumption	11
Laennec on Auscultation	17
Madden on Consumption	19
Markham on Heart	20
Richardson on Consumption	23
Skoda on Auscultation	19
Thompson on Consumption	27
Wardrop on the Heart	29
Weber on Auscultation	29

RENAL DISEASES.

Addison on Supra-Renal Capsules	4
Bird's Urinary Deposits	6
Jones' Animal Chemistry	17

SCIENCE.

	PAGE
Beale on Microscope	4
Beale's How to Work	4
Bird's Natural Philosophy	6
Burnett's Philosophy of Spirits	7
Carpenter on Microscope	8
Garner's Eutherapeia	13
Hardwich's Photography	14
Hinds' Harmonies	15
Holland on Appendages	15
Jago on Ocular Spectres	16
Jones on Vision	17
Mayne's Lexicon	19
Nourse's Students' Tables	21
Reymond's Animal Electricity	23
Schacht on Microscope	24
Taylor's Medical Jurisprudence	27
Vestiges of Creation	28
Sequel to ditto	28
Unger's Botanical Letters	28

SURGERY.

Arnott on Urethra	3
Ashton on Rectum	4
Bellingham on Aneurism	5
Bigg on Artificial Limbs	6
Bishop on Bones	6
Chapman on Ulcers	8
Do. Varicose Veins	8
Cooper (Sir A.) on Testis	9
Cooper's (B.) Surgery	9
Do. (S.) Surg. Dictionary	9
Curling on Rectum	10
Do. on Testis	10
Druitt's Surgery	11
Fell on Cancer	11
Fergusson's Surgery	11
Gay on Femoral Rupture	13
Do. on Ulcers	13
Harrison on Stricture	14
Higginbottom on Nitrate of Silver	15
Hodgson on Prostate	15
Hunt on Skin	16
Laurence on Cancer	18
Lawrence on Ruptures	18
Lee on Hæmorrhoids	18
Liston's Surgery	18
Maclise on Fractures	19
Nottingham on the Ear	20
Nunneley on Erysipelas	21
Pirrie on Surgery	22
Skey's Operative Surgery	25
Smith on Stricture	25
Steggall's Surgical Manual	26
Thompson on Stricture	27
Wade on Stricture	29
Watson on the Larynx	29
Wilson on the Skin	31
Do. Portraits of Skin Diseases	31
Yearsley on Deafness	31
Do. on Throat	31

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